Changing from the Silo Model to the Horizontal Layers Model in Public Policy Regulations: The Implications and Potential for the Telecommunications Industry

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Changing from the Silo Model to the Horizontal Layers Model in Public Policy Regulations: The Implications and Potential for the Telecommunications Industry

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CHAPTER 1

INTRODUCTION

The end of the Twentieth Century and the start of the Twenty First Century has been a tumultuous time for the Telecommunications Industry. The emergence of the technologies of the Internet as major communication tools have caused the industry to be at a cross road. In this situation, it struggles to reconcile the new methods and technologies that are currently available with the traditional methods that it had relied on in the past. Even as it moves forward to embrace the new technologies the industry finds itself embroiled in issues of governance. This is because each new innovation brings an associated governance concern. The industry finds itself in a dilemma since innovations increase at a rate faster than the laws can be changed and these render the existing laws and policies which have served it well in the past, to be in some cases obsolete and no longer appropriate for the reality of the present. All of these point to the fact that in general, the laws, policies and ways of dealing with the Telecommunications Industry need to be modified. The business of making laws however, is usually the purview of governments. Therefore, the predicament that most governments face is in how to change the laws so that other commercial sectors of their nations which rely on the telecommunications infrastructure for growth will be minimally affected while at the same time ensuring that the economic growth of their nations continue without interruptions.

Governments are also in the business of caring not only for the well being of the market sectors of their nations but also for the well being of their general pubic. Public interest, convenience and necessity are big factors in how the laws of telecommunications are changed and implemented globally and especially so in the USA. As a result of this, some very traditional countries have devised strict government regulations as a means of protecting their citizens during this period of uncertainty in the Telecommunications Industry especially in the area of the Internet. However, where strict regulations have taken place in the Internet sector, these have been seen as a deprivation of the human rights of these citizens by international watch groups. Other governments have tried to incorporate incrementally appropriate changes in the laws of their nations to accommodate the changing environment. One such government in the latter group is the United States of America. Using amendments to its already established laws, this government has tried to change the models and framework by which the industry is regulated.

In the past, the United States of America has relied on vertically integrated top down laws and methods of regulating all the different parts of the Telecommunications Industry of this nation. These laws are contained in the different numbered Titles of this Country's Legal Codes. Since the inception of these laws, regulators have been concerned with the content of the material that each group offered the general public and emphasis was placed in creating and documenting policies structured by industry, sector and type of content basis. As a result of this, the telecommunications policies, rules and procedures give the perception of having been developed in isolation with different and almost distinct sets of rules for the different entities found in this classification. This perception is seen in the Codes that show different policies for the different sub sectors such as telephony, microwave, radio, cable, satellite, TV, and newspapers. This form of regulation is usually referred to as the Silo Method. However, in recent years, especially in the regulation of the Telephony industry, the method of law and rule formulation has moved from content regulation to one in which the technologies are getting regulated in what has been described as a " Layers" Method of regulation. This methodology is based generally on the engineering format of the technologies utilized by the Internet rather than by the content nature of the service. The aim of this form of regulation relies on the premise that both the incumbent and new license holders of telecommunications services provision will be able to make available the different technologies at reasonable rates and that innovations will continue at a faster pace for the advancement of the economy and the well being of the citizens of this nation.

This form of regulation is not without its challenges as it moves the laws which govern this industry from a traditionally regulated monopoly structure to one in which deregulation and competition is encouraged. Benefiting from deregulation laws are the relatively new Internet services. As a sub sector of the Telecommunications Industry, the Internet is primarily a method of connecting in an end-to-end manner communication devices and end users for information transmission. It makes uses of an open architecture that is based on the Internet Protocol (IP) and it connects devices and users of these devices by networks over which communication occurs.

Recently an IP based technology which contributes to the effectiveness of the Internet has been gaining rapid popularity. It allows the movement of voice, data and multimedia over Internet protocols and uses packet switching networks and technologies rather the traditional telephony circuit switching networks of Telecommunications Service Providers. This technology Voice over Internet Protocol (VoIP) is not new. Regional incumbent telecommunications voice service providers as well as incumbent long distance voice service providers have been using it for a while.

In order to encourage even more wide spread use of VoIP, on Tuesday November 6th., 2004,[1] the FCC voted 5-0 to exempt Vonage and other Voice over Internet Service providers from state regulations. Vonage had been involved in a conflict with the State of Minnesota which had required it to register in the state as a Telecommunications Service Provider and as a result of this become responsible for rate regulations. Vonage wanted to be listed as an Information Service Provider who is not subject to these charges. With the November 2004 ruling, the FCC exempted all cable TV and providers of Internet phone service from state regulations. Of particular importance is that Information Service Providers do not have to subscribe to Universal services fees provisions such as 911 and other emergency services while traditional telephone carrier have to provide this service. The dangers of VoIP services not having emergency provisions was made apparent when a 911 call was made from a VoIP phone for assistance to a dying couple and the call could not go through as this service was not provided.[2] As a result of this, VoIP is seen as a risk to public safety by the Association of Public-safety Communications Officials.[3] To correct this perception, the FCC in May 2005 adopted an order that imposed E911 requirements on VoIP providers for some

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[1]Paul Davidson, FCC exempts VoIP from state regulation, usatoday.com, http://www.usatoday.com/tech/news/2004-11-08-voip-usat_x.htm.
[2]Newsfactor.com, Wireless networking, VoIp poses problems for emergency call systems, newsfactor.com, March 8th., 2005, http://www.newsfactor.com/story.xhtml?story_title=VoIP-Poses-Problems-for-Emergency-Call-Systems&story_id=105.3257310&category=wlsnetw.
[3] Newsfactor.com, Wireless networking, VoIP poses problems for emergency call systems, March 8th., 2005, http://www.newsfactor.com/story.xhtml?story_title=VoIP-Poses-Problems-for-Emergency-Call-Systems&story_id=105.3257310&category=wlsnetw.

VoIP services and this has a November 28th., 2005 deadline. [4] This action has prompted some VoIP providers to consider seeking legal actions. [5]

Another concern that the Telephony Industry faces, is that the technology that is currently available for the provision of VoIP services is easily accessible and the industry has almost no barriers to entry. An example of the type of problem that this creates is seen in the company Skype of Luxembourg in Germany that offers Skype Out services. Skype Out telephony services are offered at a prepaid rate that is less than traditional telephony costs to any where in the world. How this affects the USA is that Skype is not a U.S. company or carrier and as such is not subject to the regulations of the FCC nor is it subject to the 911 call provision requirements.[6] Although, in September of 2005, eBay Inc., a USA company agreed to purchase Skype for $2.6 billion in cash and eBay stock as well as other considerations[7], this does not change the fact that there are other non USA companies that will attempt to use this technology and the favorable regulation scenario that Skype was part of but which from an incumbent's perspective may warrant some concern.

[4] Mofo.com, Release of Order Imposing E911 Obligations on VoIP Providers Prompts Opposition, Morrison Foerster, Legal Updates and News, Communications Law Bulletin, June 2005, http://www.mofo.com/news/updatws/bulletins/bulletin02022.html.

[5] Mofo.com, Release of Order Imposing E911 Obligations on VoIP Providers Prompts Opposition, Morrison Foerster, Legal Updates and News, Communications Law Bulletin, June 2005, http://www.mofo.com/news/updatws/bulletins/bulletin02022.html.

[6] Newsfactor.com, Wireless networking, VoIP poses problems for emergency call systems, March 8th., 2005, http://www.newsfactor.com/story.xhtml?story_title=VoIP-Poses-Problems-for-Emergency-Call-Systems&story_id=105.3257310&category=wlsnetw.

[7] Skype.com, eBay to Acquire Skype, Skype, London, September 12, 2005, http://www.skype.com/company/news/2005/skype_ebay.html.

Another VoIP problem is that traditional telephone companies are now offering Television, Radio and Internet services. [8]In the past this method of operating was not allowed as the broadcasting sector was regulated differently from the telephony sector. However, with the introduction of these new non telephony services the Telecommunications Industry finds that there are new policy issues that have to be addressed. A major concern about regulators now is deciding how to treat voice services which have been a regulated sector of the economy when it merges with areas such as information services and the Internet services which have not been regulated. Essentially, the decision process centers around the merits of the Silo Method of policy making and regulating as opposed to the Layers Method

This paper will first consider whether the Silo Method of regulation is in actuality the same as using the Horizontal Layers Method of regulations and it will show that this is the case. Then it will try to determine if telecommunications services are the same as information services and it will show that this is the case. While studying in detail the technologies of VoIP , the paper will try to find out if VoIP is a telecommunications service or an information service. The conclusion will be seen that it is both since telecommunications services are the same as information services. Furthermore, it will try to see if from a policy perspective the layers model is an appropriate tool for regulation of VoIP and it will show that the structure of the Internet is in actuality built on the structure of the laws. Given that this is the case, the laws are appropriately structured to handle the regulations of these new services. This conclusion does not hide the fact however, that in its present implementation, there are inconsistencies in the requirements of the laws. As a result of this, the paper will examine the effects of the

[8] Economist.com, Business, Digital convergence, TV on your phone, January 13th., 2005, http://www.economist.com/business/displayStory.cfm?stoty_id=356695.

laws on current telecommunications policies pertaining to the Internet and telephony. This paper will look at the work of Richard S. Whitt (2004) in detail and dissimilarities between the author and Whitt will be analyzed. Although issues pertaining to the Internet and the structure of its organization are discussed briefly, the topic of Internet regulations will not be analyzed in this paper.

CHAPTER 2

PROBLEM STATEMENT

The Telecommunications Industry is in a quandary. Though it had survived a period of poor growth due to the problems that the "dot coms" had during the end of the 1990',s it had rebounded and was experiencing tremendous growth by the start of the Twenty First Century. In 2004, it grew by 7.9% compared to the 3.6% growth it had experienced in 2003 and the 1.9% it had experienced in 2002.[9] In fact, it is estimated that total revenue for this industry in 2004 was $784.5 Billion[10] and this was expected to grow to $1.1 Trillion between 2005 and 2008[11] at an annual growth rate of 9.5%.[12] This growth however, masks massive upheavals and problems among the established and newer communications technologies.

During this period, new technologies are undercutting the viability of the old ones and the stability of the industry is affected by many company mergers. Examples of such recently announced mergers are that of AT&T parent merging with SBC Communications, and AT&T wireless merging with Cingular Wireless LLC in the United States of America.[13] Also, in the USA, an added problem is that those who have been in the industry longer believe that the regulations under which they operate are not as lenient as those of the newer entrants to the industry. This perception of unequal regulations has developed

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[9] Sharon Grace, TIA Online.org, Spending in U. S. Telecom Industry Rises 7.9 % to $784 Billion in 2004, February 1, 2005, http://www.tiaonline.org/media/press_releases/index.cfg?parelease=05-03.

[10] Sharon Grace, TIA Online.org, Spending in U. S. Telecom Industry Rises 7.9 % to $784 Billion in 2004, February 1, 2005, http://www.tiaonline.org/media/press_releases/index.cfg?parelease=05-03.

[11] Sharon Grace, TIA Online.org, Spending in U. S. Telecom Industry Rises 7.9 % to $784 Billion in 2004, February 1, 2005, http://www.tiaonline.org/media/press_releases/index.cfg?parelease=05-03.

[12] Sharon Grace, TIA Online.org, Spending in U. S. Telecom Industry Rises 7.9 % to $784 Billion in 2004, February 1, 2005, http://www.tiaonline.org/media/press_releases/index.cfg?parelease=05-03.

[13] Yahoo Finance, Recent Telecom Mergers, Monday February 14, 2005, http://biz.yahoo.com/ap/050214/telecoms_mergers_glance_4.html.

because the government is permitting a different and less stringent standard of regulation for the new areas as it struggles to determine how to regulate them. The problem of how to regulate sectors of the Telecommunications Industry is not limited only to the United States of America. This is now a global problem as many nations find that the old and traditional rules, laws and regulations that their Telecommunications Industry had relied upon to guide its activities were fast becoming obsolete and inadequate. One way in which many nations have handled this crisis as a first response method, is to deregulate aspects of the industry in order to maintain their competitive edge.

This has been the case with the United States of America. In this country, the telecommunications regulatory bodies includes the Office of the President, the Senate and Congress of the United States(national as well as by state), The Courts, The National Telecommunications Information and Administration (NTIA), The Federal Communications Commission (FCC) , as well the Public Utility Companies (PUCs) and the Public Service Commissions(PSCs) of the different States. These have all grappled with different regulatory structures that include deregulation methods in their aim to maintain a just and competitive business environment that allows innovations to occur, while taking into consideration the well being and specific pubic interest of the citizens of each state as well as of the country as a whole.

Providing the right set of regulatory guidelines for this industry has not been an easy process. This is because regulators have had to constantly contend with the changes in an industry that has in general been very dynamic. This dynamism of the industry has been further energized by the development of the Internet. The Internet is a new sub sector of the Telecommunications Industry which exists as an independent identity that crosses and directly affects the activities of the other sectors. Although it bought increased growth and revenues to other parts of the telecommunication industry, it also created new problems for this industry as a whole regarding how regulations should now occur as its existence renders the old regulatory infrastructures now in place inadequate.

In the past, the Telecommunications Industry has been regulated as an ‘analog’ ‘infrastructure‘ industry in which sub-components were regulated in an end-to end manner. This form of regulation is given in the Telegraphs, Telephone and Radio Telegraph section of Title 47 of the US Code[14] of Laws which documents regulations that pertain in general to the Telecommunications Industry. In this section of The Code, laws pertaining to the different groups in this Industry are treated as individual Chapters. A cursory look at the laws as listed in this manner gives a suggestion that there is no apparent legal connection between the different sectors in this industry and that the laws for each sector is an isolated self contained individual entity. In this view, laws in each self contained section are seen as only dealing with issues pertaining to that given sector in a vertical end to end manner and this is currently seen as restrictive given current technologies. However, this study will show that this is not the case as will be discussed later.

The history behind this method of regulating telecommunications in the United States dates back to 1927. This was the time it was first recognized that this was a vital industry in need of regulation and this was done with the Radio Act of 1927. The Radio Act of 1927 was later incorporated into the 1934 Communication Act,[15] and this Act, was the first Act to recognize

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[14]Uscode.house.gov, Telegraphs, Telephones and Radio Telegraphs, http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t45t48+1275+11++%28%29%20%20.

[15] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p159, Houghton Mifflin Company, 1972.

telecommunications as legal entity in the United States of America.[16] However, with the proliferation of computers and the Internet, the industry experienced convergence as all the different aspects of its identity became digital rather than analog. This convergence of this industry was facilitated by high speed communication methods that became available. This allowed the providers of services in this industry to use intelligent computers in intelligent networks to cater to the needs of consumers by offering different arrays of new services. It is the regulating of these services that now creates problems.

Among these new services is the Voice over Internet Protocol (VoIP), which allows digitized packets of voice data to travel over IP networks than over conventional switched circuit networks. To facilitate the implementation of these services however, it is important to have large outlays of investment for setting up the necessary infrastructure that are required. The physical infrastructure involves such things as laying of fiber optics lines, purchasing of satellite stations as well as buying up licenses for appropriate bandwidth in the electromagnetic spectrum for transmission.

Once expenditures in investments are made, investors are interested in recouping their investment. Without a clear indication that this will be accomplished given the large sums of money that is usually involved, the investments that are needed for growth in this industry cannot go on. For example in 2005, it was announced that SBC would in a $4 billion investment, offer its consumers line speed of 20 to 25 Mbps[17] through fiber optics lines over a three year time frame. This is a 2500% increase in bandwidth over the Digital Subscriber Line (DSL) Bandwidth of 1.5Mbps that is currently being offered by some service providers.

[16] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p159, Houghton Mifflin Company, 1972.

[17] Pete Lerma, True Convergence Is on the Horizon, January 25, 2005, http://www.clickz.com/experts/media/agency_strat/print.php/3462841.

Costs like this make it imperative that clear and workable policies are in place that will guide the industry as it moves forwards into achieving its goals in the future.

Another outcome of convergence and with it another problem is that it has allowed all the different parts of the Telecommunications Industry to become integrated and this allowed the industry to move from a regulated one to one in which competition among market forces were allowed to occur in a deregulated environment. Reacting "cautiously'' to this inevitable transformation, the Congress of the USA added new laws to try to deal with this change. The Communications Act of 1996, was essentially a modification of the 1934 Communications Act (Frieden, 2001) [18] to manage some of the changes that the industry was experiencing in incremental steps. With the assistance of several new rules and laws among which are the Three Computer Inquires, the 1996 Communication Act, and most recently the Triennial Report of 2003, the Federal Communication Commission, (FCC), Congress and the Courts of this nation have incrementally tweaked at the laws that relate to all areas of telecommunication.

In the case of telephony, the FCC first defined telephone services at first as either Basic or Enhanced Services which relied on protocol assessments on the amount of modifications were done on the signals that used computer technology. Then the FCC later changed this and made regulations using definitions that pertain to "Telecommunications' or 'Information' Services. These regulated based on access to networks and network elements and current regulations and regulatory guidelines are based on these definitions.

[18] Rob Frieden, Managing Internet Driven Change in International Telecommunications, p247, Artech House, 2001.

Though some see the changes in the Telecommunications Act of 1996, as a move to layered horizontal method of policy formulation, Whitt (2004) disagrees with this as according to him, the Title Codes of the United States Legal statutes were still the underlying core of these new laws. His contention is that these codes which had been used as a guideline for managing the affairs of this industry had become rigid and inflexible and unable to address the problems of the industry in its current time. He attributes this inflexibility to the fact that the Communications Act of 1934 and its later modifications were in actuality built around the vertical silo structures while the elements of the industry had moved to a horizontal layering concept that utilized layered protocols in end-to-end networks.

His solution to this problem is that since newer telecommunications networks were made of ' dumb transport medium with intelligent applications'[19], they should be regulated using a four layered model, that is based on the OSI model of computer protocol design. His model for regulation would have the upper applications or content layers where the knowledge of networks are located unregulated as a means of encouraging competition, while the lower or physical layers would be regulated.

As commentators such as Whitt and others including the regulating bodies of the Telecommunications Industry study the issue of how to regulate the industry in general and voice telephony in particular it is becoming apparent that maybe a different set of paradigm have to be designed and employed. This need has become intensified by recent developments in a computing technology which allows voice, data as well as multimedia services to converge and be transmitted over the Internet using the IP protocol. What this

[19] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model. Federal Communications Law Journal Vol 56, May 2004, Number 3.

has done is that it has brought services such as the traditionally regulated telephony services to integrate with the currently unregulated information services of the Internet.

This convergence or the merging of public voice and data networks, makes voice one of the many services provided over a data network instead of it just being the service of a Public Switched Telephone Network (PSTN) (Einser et al (1998))[20]. What convergence does is that it allows a connection oriented technology to become part of a connectionless packet switched technology. The outcome of this is that that it has allowed new competition into the Telephony Industry. Information Services Providers and Cable Network Providers are now together with traditional incumbent Telecommunications Services Providers such as the Bell Operating Companies and Long Distance Service Providers such as AT& T in providing Internet and telephony services.

This new permission structure has the potential of creating inefficiencies in the telecommunications market as it highlights inconsistencies in the laws. This paper, by studying VoIP will try to see if from a policy perspective, the layers model is an appropriate tool for isolating differences in service types and from there make a conclusion about whether the silo method of regulation is in actuality the same as using the layers method in regulatory matters and what this means for telecommunications policy formulations in general. It may be that there is an essential need for a more comprehensive telecommunications policy that will encompass all its different aspects, from the different mediums to the different uses and services as an integrated whole even as it recognizes the differences within each sub group.

[20] Sharon Eisner Gillet, Ingo Vogel Sang, Competition Regulation and Convergence, Current Trend in Telecommunications Policy Research, p xxii, Lawrence Erlbaum Associate Publisher,1998.

Research Question

This paper will use the features of Basic as opposed to Enhanced Services, Telecommunications as opposed to Information Services, Networks, Network Elements, Intelligent Networks (IN), and the emerging Voice over Internet Protocol (VoIP) service to answer the following research questions as a first step in working towards that policy formulation:

1. Is the Horizontal Layers Model the same as the Silo Model from a structural perspective? If they are the same, is the Silo Model an adequate regulatory structure for regulating the current Telecommunications Industry from the perspective of VoIP?

2. Then it will ask the question – Are Basic Services and Enhanced Services the same? Similarly, are Telecommunications Services the same as Information Services? If they are, are there inconsistencies that are in the laws based on how these two different services are regulated?

3. Following the answers provided in #1 and #2, it will ask if generalizations can be made from the VoIP study to telecommunications in general?

Specifically, it will try to show that Intelligent Networks (IN) elements which are based on the Layers Model and which are located in intelligent devices form essentially end to end networks. From end to end networks, point to point connections are made and this is the basis of all communications. Furthermore, Intelligent Network elements are program modules built up from protocols that stipulate the manner in which network devices in general communicate with each other. What this means is that the definition of services (Data Processing, Hybrid, Communications, Basic, Enhanced, Telecommunications, Information) as given by both the FCC and the 104th Congress in the Telecommunications Act of 1996, are predicated on the functions of these intelligent network elements and that these are all the same. My argument is that the current innovations in technology have made all these services inherently the same with little distinguishing factors among them. From this premise, the paper will try to show that since Telecommunications Services as defined by the law are essentially the same as Information Services, the current differences in the manner of regulation of these services contain inconsistencies. If this is the case, conclusion can be reached that the current regulations that pertain to VoIP as compared to other telecommunication services embody inefficiencies.

Furthermore, it will try to show using VoIP that although the Internet is an end to end/point-to-point network by design that is usually represented by horizontal layers, it does in actuality work on a vertical manner and is a vertical network as well as a horizontal network. As a result of this, by extension then, using a horizontal layers model in formulating polices for telecommunication is equivalent to using model that is also vertical. If this is the case, the vertical Silo Model of formulating polices that is currently used by the FCC and the Congress of the USA, can also be regarded as a horizontal Layers Model and as such an appropriate model for policy formulating.

Finally, the paper will also look at issues that are currently affecting the Internet as examples of the challenges that regulators face as they try to formulate policies for the Telecommunications Industry. This is due to the fact that the Telecommunications Industry (especially in the area of telephony), is rapidly converging with information processing networks and the Internet. This paper will try to see the limitations of both the Silo and Layers Models which may hinder the development of policies in the ‘new’ telecommunication industry and make suggestion as to a structures that will help promote the business of the industry as well as the well being of peoples as it moves forwards in the Twenty First Century and beyond, with a solid telecommunications policy foundation on which other laws and rules for new technologies can be built.

CHAPTER 3

CONVERGENCE AND REGULATION

As with every thing in nature, there is usually more than one side to an issue. To simplify things though especially with regards to legal matters and Rule of Law, two main view points and positions are currently popular. There are those like Huber(1997) who contend that regulations are the blight and scourge of the legal system and that matters should be left to the market to form their own possible commons – meeting of the minds as to which law should prevail. He draws from the fact that this system uses primarily historical information from the events that had already occurred and that antitrust proceedings settle the matter the way the market would like to see it settled using rule of Common Law. His viewpoint is shared by Pociask (2004)[21] who contend that regulating prices and services with respect to telephony for example are not necessary as market influences will provide an equilibrium. A limitation with this view is that market forces change policies rather slowly thus, it is hindered in how It handles the current rapid technological advancements.

On the other side of the regulatory view point position are the early adopters. They are usually first in implementing new improvements in technologies and they bear the burden of being the ones the common laws gets tested on, as governments try to find correct blends of policy mixes. One such is Horwitz (1988) who contends that regulation may not be so bad. He is of the opinion that economic regulation was a successful tool that advanced industrial growth which was responsible for providing the framework for "stabilization, growth and "universalization" of the Telecommunications

[21] Stephen Pociask, FCC is Ignoring Impact of Wireless, other Rivals for Telephone Service, LocalTechWire.com, Tuesday January 18, 2005, posted 12/20/2004, http://www.localtechwre.com/article.crm?u=10174.

Industry in the United States.[22] He sees the problems of regulations primarily as unraveling what is in the best interest of the public from a mix of competing democratic enterprise interests , market systems and the good intentions of states trying to protect all of these as a whole at the same time.

Bringing the two sides together so as to find a solution for the current telecommunications problems has not been easy. In the middle of all of this are those in policy formulation roles who because they understand the pains of both sets of viewpoints have tried to recommend structural framework of rules that will satisfy each side while allowing for the efficient and proper functioning of the regulatory apparatus in place. In this role, policy formulators work at getting the different sides to the same place in time. In the United States of America, the FCC as the primary regulating body of the telecommunication industry acts as the go between of the Executive branches - - the President, the Courts, the Senate, Congress and the States. For these rule makers and implementers, the advent of computers in the telecommunications mix has precipitated an alternative manner of thinking of how and in what way new regulatory structures should be formed and how they should operate. Computers have forced a rethinking of the laws by using the fragmenting techniques of convergence which also has the unique ability of linking varying and differing sectors to form a whole.

Huber(1997) explains convergence [23] and fragmentation as the breaking apart of the old integrated centralized media. The new technology has the capability of replacing terminals – “dumb endpoints” to the network with semi-nals' – nodes of equal rank that

[22] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p viii, Oxford University Press, 1989.
[23] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p4, Oxford University Press, 1997.

do the same activities (process, switch, store and retrieve information) that in the past only massive switches and large mainframe computers could do. These newer technologies rely on digital bit transformation that causes data and information no matter what its content or form to be represented by bits. The technologies of convergence work on bits.

Giving a definition to the term “convergence” has not been easy and this is an issue that is still debated today. In 2003, Finberg, noted that convergence was not deregulation and that convergence was a relative term depending on the context and field in which it was used. Deregulation he contended was about the rules of ownership, while convergence was about “ …well, its about many things it depends on your vantage point.”[24] He shares the opinion of Pryor (2003)[25] that although convergence takes away hidden agendas while promoting “fairness, thoroughness, balance, empathy, as well as ethics’, there is a need to have a common vocabulary and understanding of it by the use of standards.

Although at first glance, convergence may seem to be about the content or information that is communicated, it is in actuality about the processes related to the technology that makes sending and receiving any type of content possible. In this regards then, it can be seen how closely associated with convergence regulation and deregulations issues become. This is because it results in the fact that attempts at managing the legal environment for visionary entrepreneurs who as early entrants favor deregulation so as to be competitive, are later the same ones who as incumbents favor regulations so as to

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[24] Howard, I. Finberg, Deregulation is not Convergence, Poynter Online, Posted Jun 3., 2003, http://poynteronline.org/content/content_print.asp?id=35783&custom=.
[25] Howard, I. Finberg, Deregulation is not Convergence, Poynter Online, Posted Jun 3., 2003, http://poynteronline.org/content/content_print.asp?id=35783&custom=.

protect large investments they may have made. Participants in these industries have large infrastructural form and Howitz (1989), notes that these industries also shared other common features. Among these were that they were the ones that were committed to the provision of “basic social equity”, [26] also, they had an ‘obligation to serve’ which is a principle that is an important part of common law. [27] He lists among these industries, airlines, trucking, railroad, telecommunications, banking, oil and naturals gas industries. These industries he contends are vital for commercial and capital processes. [28] With regards to the Telecommunications Industry however, Howitz is of the opinion that although this industry did fulfill a public interest obligation, he believes that recent efforts of the FCC ended up protecting the principals of this industry because the policies that were created were “narrow and conservative. Regulated industries he continues are “price-and-entry” controlled industries. This is because a specific agency controls what price is charged as well as who gets to enter the industry.

The outcome of such a policy strategy is that boundaries and barriers are formed which in turn result in large ‘cartels’ formations that facilitate cross subsidy. He gives as an example of this, the Telephone Industry where long distance rates were used by large companies to subsidize local rates. [29] This he argues causes inventive entrepreneurs to find a way to provide services for large corporations who choose not to participate and who may choose to ‘drop out’ of the regulated system. Theses large corporations are however harmed in inflationary times when they are affected by large price increases

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[26] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p viii, Oxford University Press, 1989.
[27] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 7, Oxford University Press, 1989.
[28]Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p viii, Oxford University Press, 1989.
[29] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 7, Oxford University Press, 1989.

that regulating agents may grant.[30] When this happens, these large businesses try to get around the new pricing structures by forming networks that call for a change or deregulation. What this shows is that at all times, the agencies act in manners that they believe protect and keep safe the system they are regulating.

Reasons for Regulation

According to Howitz(1989), regulation started as a “interventionist’ state tool that was invented at the start of the Twentieth Century in the form of agencies to address general economic and social problems that arose from the emergence of large corporation. [31] At its core is state directed national development by private organizations within a democratic capitalistic framework. The final hope of this device was that economic growth would occur for the good of the public. Agencies that were created during the New Deal and Progressive Eras agencies of the Late Nineteenth and Early Twentieth Century in the United States of America, such as the Federal Communications Commission (FCC) contributed to economic stability by providing policing functions as well as by providing a forum in which difference among businesses could be settled. They dealt primarily with the economic aspects of businesses and it could be differentiated from agencies of the Great Society Era which were created in the mid 1960 and 1970’s in the USA which dealt primarily with the social impact of business.[32]

Regardless of the time of their formation Howitz contends that all agencies are affected by administrative law and are subject to the same limitations which he gives as

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[30] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 7, Oxford University Press, 1989.
[31] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 9, Oxford University Press, 1989.
[32] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 10, Oxford University Press, 1989.

“institutional, bureaucratic and procedural. ”[33] Furthermore, as in Thirteen Century English law where certain occupations were given common labeling and as such a different classification and treatment, the same is true for infrastructure industries in which the states have been involved through “promotion, subsidization and eminent domain law” in the Nineteenth Century, while in the Twentieth Century state involvement has been mostly of a complex administrative format.[34]

As an infrastructure industry that has a public function component, the Telecommunications Industry has been protected by the USA Government as a public interest endeavor since its inception. First, monopoly was used to safe guard the telephony sector of this industry and later, the government continued the protection of the Radio and Television sectors by implementing broadcasting laws that provided a standardized system for managing the airwaves as well as the services and corporations that provided these services.[35]

Essentially in the Telecommunications Industry the method or “medium of circulation” was what was regulated. This is what common carrier regulation dealt with. Goods and services depended on the medium for their circulation and it was stipulated that a carrier could not make distinctions or discriminate in providing access to its services to all using a price structure that was fair. This was the basis of universal service. Here the intent

[33] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 11, Oxford University Press, 1989.
[34] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 12, Oxford University Press, 1989.
[35] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 12, Oxford University Press, 1989.

was to promote commerce and these are the principles on which common law is built . [36] Horwitz notes that common carrier laws were simply a “a guaranteed means of access to the means of transmission”[37], while the fulfilling a social function of social equity. The Telephony Industry was regulated primarily using common laws that form what Horwitz terms the “commerce principles’. These principles made sure that access to telephone services were non-discriminatory. These laws Horwitz contends, were in actuality commerce laws that separated out the control of the means or medium of communications (these are the conduits or route type) from the content or services (the actual information) going through the medium. By these separations, the laws ensured that the commerce principle(Contractual freedom) met the requirements of what he termed the ‘freedom of speech principle’ (Market place of ideas) .

In distinguishing between the contractual freedom(commerce principle) and freedom of speech principle(market place of ideas), Horwitz reasons that contracts (commerce principle) are private legal agreements in which those who can participate in it, have independence in how they can behave as well as in their as speech and in their thought. It is a legal privilege of those that believe that they are free after struggles for individual rights to speech. Behind contractual rights are the notions that there is an ‘ open market’ which promotes ideas and is one in which there is general truth. [38]

The market place of ideas (freedom of speech principle) he further continues is determined by access to means of communications. It is generally thought of to be free

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[36] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 13, Oxford University Press, 1989.
[37] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 14, Oxford University Press, 1989.
[38] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 15, Oxford University Press, 1989.

of government intervention and according to him it is a public forum which creates issues of power because mass communication is essentially a model of monologue. He maintains that those with wealth can give out their views, while most can only listen as this is in actuality what the First Amendment right of most people are - it is to listen and read, not speak.[39] This then according to him does not constitute dialogue as one only listens while another speaks. As such although there is supposed to be a dialogue in this marketplace it does not occur. Given that this is the case, the form or type of the media that allows the communication as well as the type of 'terms" of access affect the quality of the market place. Essentially the freedom of speech or thought that is actually available to participants in this forum is inherently determined by the quality of the communication that they are allowed. The inference that can be made from Horwitz's study is that if currently advocated horizontal methods of regulating use a separation of medium as distinguished from content in new telephony laws as has been advocated by some such as Whitt(2004) , then the new laws that will be made will have this same 'flaw' as the old laws.

Under regulation, Horwitz contends public interest were an "attached", paired or part of certain technologies and to their protection. The laws made sure that public interest and the protection of these technologies went hand in hand. What deregulation on the other hand did, according to Horwitz, was to disconnect telecommunication technologies from the aspects of public interest. He contends however, that this was not necessary, as technological innovations would have changed and detached the connection between the two naturally, thereby eliminating need for deregulation as the public interest aspect would have been eliminated without it having any legal or material basis.

[39] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 15, Oxford University Press, 1989.

In arguing against deregulation, he continues that what it did, was to cause these public interest issues which would have been disappeared, to become redefined as innovations and as competition.[40] For him then, regulation provided order to infrastructure industries by stabilizing the markets through fixed market share and prices, [41] that allowed "corporations, organized labor and consumers" to exist in a stable environment. Deregulation on the other hand undermined this by making regulators require of corporations that they give up to the market place their technological expertise. This expertise is then used by competitors as innovations in services.[42] The inference here is that current deregulation laws are essentially maintaining the public interest mandate in a disguised form which is now seen as innovation in services.

Structure of Policy

Against the background just discussed, there is the question of what format should the structure of policy making take with regards to telephony? This is also not an easy structure to suggest especially when the convergence of telephony and the internet are considered. Currently, the Internet is not regulated while the telephony sub sector is regulated. As an international body, it is administered by the Internet Corporation for Assigned Names and numbers (ICANN). The next chapter takes a look at the bodies that govern the Internet. The reason for this is to give a very broad perspective of what may be involved if and when regulating the Internet gets to become the regulating of the Telecommunications Industry. In the very new future this may become an issue as already some like Whitt(2004) are of the opinion that telecommunications is the Internet.

[40] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 17, Oxford University Press, 1989.
[41] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 17, Oxford University Press, 1989.
[42] Robert Britt Horwitz, The Irony of Regulatory Reform, The deregulation of American Telecommunications, p 15, Oxford University Press, 1989.

CHAPTER 4

THE INTERNET

In light of the regulation factors that were discussed in the last chapter, this chapter will look at the structures that make policies in the Internet sector. The reason for looking briefly at the structures that make policies for the Internet is to give the reader an idea of the general organizational policy structures that this sector which is not regulated by the FCC but by other organizations - national and International has. This way, the reader will have a rounded and 'whole' view by the end of the paper of how the components that are involved in making policies for the Telecommunications Industry interact and impact each other.

The Internet is different in that the laws by which it abides are not just related to those that are made nationally by individual nations but also by those that are made by standards organizations. Unlike national laws which are political and aimed at meeting the needs of the citizens of a nation, the Internet laws are global and individual participation is welcomed. The laws formed by the different standards units are adhered to when ratified and are used for the efficient processing of the technology as a whole. It is these organizing bodies of the Internet that determines which layers of the OSI horizontal layers model, new or modified technological innovations should be a part of and reside in. Essentially, they determine after extensive work, the location of technologies before the national governments are made aware of their existence as a factors that are in need of policies for their management. Further more, the structure of the Internet now makes it such that national and international laws are more than ever intricately intertwined.

To make future telecommunications policies that will relate to either the Silo or Layers Models, regulators have to be aware of the role of the Internet not only from a national perspective but also, from an International perspective. This is so that policies that are made do not end up producing conflicting results which would adversely affect commerce and hence the economy of the nation.

Internet Governance

From a regulatory perspective, the Internet is managed by several bodies that make its standards, protocols and rules. The regulatory mechanism of the internet is like the internet itself. It involves having the mindset of an extremely intelligent amoeboid ion - in this case bits as data packets that can move in numerous directions by splitting and then have the ability to reconnect and be whole again at the destination. In general, concerning governance of the Internet, there are lots of different groups that participate to make it the 'whole' that it is. These include the according to Matsuura (2000), governments, international organizations, Internet service and product providers, Internet users and the general public.

In the areas where the actual technical aspects of the Internet are concerned, the international organizations have utilized a form of governance that is primarily in the form of management by objective consensus. In these areas all the different parts of the Internet stress the international scope of the Internet as well as its geographic and cultural diversity. As open organizations, for the most part, these policy formulating groups allow all to participate except for the ITU, where the Internet decision's making process is by membership. From an international perspective then, the protocol and standards decision making process by which the Internet operates is supposedly open to people from every country in the world who can have input and access to the decision that affect the Internet before they become accepted rules, standards, protocols and policies.

Forming a centralized governing body for internet issues that relate to the United States of America came about in July 1997, when then President Clinton of the United States America, proposed ' A Framework for Global Electronic Commerce' and mandated the privatization of the domain name system. The secretary of Commerce was given the task of getting new management structures in place. In 1998, the government advised the Internet to administer itself by issuing a Statement of Policy entitled Management of Internet Names and Addresses (the "White Paper"). According to Zittrain (2002) the strategy that was formed from this order is from a policy perspective 'unfocussed' because it did not address the critical issues that were to be considered.[43] Many may disagree with Zittrain. His assertions will not be analyzed in this paper. Rather a brief look at the outcome of the order and the ensuing policies that were implemented will be looked at.

The request to form some centralized administrative unit came about because the Internet was growing rapidly and this was the government's efforts at privatization. This request resulted in the signing of a Memorandum of Understanding (MoU) between the US Department of Commerce and the Internet Corporation for Assigned Names and

[43] Jonathan Zittrain, Book Review of What's In a Name? Ruling the Root, Milton L Muellller, Cambridge, Mass: MIT Press, 2002 301 pages, http://papers.ssrn.com/sol3papers.cfm?abstract_is350560, forthcoming in the Federal Communications Law Journal.

Numbers (ICANN) and agreements between ICANN, Network Solutions Inc (NSI)and the Department of Commerce[44].

Specifically, the agreements did the following[45]:

1. Called for NSI to recognize ICANN.
2. Provided a fee structure for registrations of domain as a registration fee.
3. Mandated a process for shared registrations and renewals. Domain registrations were to be on an annual basis and the same applied in the case of registrar transfers.
4. Stipulated a Registry Agreement that was to be for 4 years with NSI it also included an option of an extra 4 years with NSI and gave consequences of a contract breach from NSI.
5. Allowed NSI to establish its own price for registrar services.
6. Allowed NSI to manage the Top Level Domain (TLD) zones and mandated access of third parties access to these zones.
7. Stipulated the authority that ICANN had with regards to carrying out its compliance duties. Included in this was the definition of what enabled ICANN to take action as well as a procedure for determining that conditions for taking actions were met.
8. Stipulated consequences for breach of authority by ICANN, this included failure to enter into contractual registry agreements with other registrars.

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[44] ICANN, Fact Sheet on Tentative Agreement among ICANN, the U. S. Department of Commerce, and Network Solutions, Inc, posted September 28, 1999, http://www.icann.org/nsi/factsheet.htm.

[45] ICANN , Fact Sheet on Tentative Agreements among ICANN, the U. S. Department of Commerce, and Network Solution, Inc., Posted September 28th., 1999, http://www.ICANN.org/nsi/factsheet.htm.

9. Made provision for the funding of ICANN by stipulating a provision that registrars fees must be equitable and must be approved by the registrars. NSI agreed to this with the stipulation that its portion of the registrar's fee did not exceed $2 Million.
10. Maintained that accredited registrars would provide searchable access to the registration database. Made provision also against use of the database for spam proliferation.
11. Specified cost of allowing third parties access to the registration database .
12. Phased out the use of the term InterNIC and transferred management of this site to the Department of Commerce.
13. Allowed NSI management of the Authoritative Root Server.

Between 1993 and 1999, Network Solutions Inc, (NSI) had been the organization that managed the domain assignment since they had a contract with the National Science Foundation (NSF) and they were the only organization that registered domain names for the ".com", ".net", and ".org public domains. By the end of 1998, NSI had registered over six million domain names.[46]

Following the mandate of deregulation and privatization, ICANN took over this duty. From the one accredited registrar of domain names in 1998, this had grown tremendously. By September of 1999, there were 76[47] accredited registrars and by the

[46] Living Internet, Internet Management – Network Solutions, http://livinginternet.com/i/iw_mgmt_netsol.htm.
[47] ICANN , Fact Sheet on Tentative Agreements among ICANN, the U. S. Department of Commerce, and Network Solution, Inc., Posted September 28th., 1999, http://www.ICANN.org/nsi/factsheet.htm.

end of October 2004 ICANN had over 432 accredited registrars in its directory.[48]

Currently, ICANN is an international non-profit organization. Its article of incorporations states that ICANN is primarily concerned with the following:[49]

- Management of the technical aspects required for maintaining universal connectivity to the Internet.
- Management of Internet IP address space
- Management of the Internet Domain Name System (DNS) and Top Level Domain TLD additions
- Management of the Authoritative root server
- Overseeing other matters relating to the law that concerns the Internet

ICANN is supported in its Management tasks of administering the Internet by 3 Supporting Organization (SO). These are the Address Supporting Organization (ASO), The Generic Name Supporting Organization (GNSO) and the Protocol Supporting Organization (PSO). Many other national and international organizations among which are the National Telecommunications and Information Administration(NTIA), the World Trade Organization (WTO), the World Intellectual Property Organization (WIPO), the Council of Europe, (CoE) and the Organization for Economic Co-operation(OECD), the United Nations Commission on International Trade Laws (UNCITRAL) and the United Nations Conference on Trade and Development (UNCTAD). Appendix 1 shows the Internet Administration and those organizations nationally in the USA and some Internationally that administer its business.

[48] InterNIC, The accredited Registrar Directory, Registrars Alphabetical by Company Name, Last updated on Wednesday, 27-October-2004, http://www.internic.net/alpha.html.
[49] NTIA, Articles of Incorporation of Internet Corporation for Assigned Names and Numbers, http://www.ntia.doc.gov/ntiahome/domainname/proposals/icnn/articles.htm.

Role of Internet in Decision Making Processes (A Brief Global Perspective)

The foregone discussion show that the International governance of the Internet is not really in the hands of one committee, one group or for that matter one country. At best, the pronouncement that was made by President Clinton of the United States of America can be seen as an attempt to have a centralized unit that can co-ordinate some of the essential core activities these international organizations are involved with in a succinct manner for aspects that pertain to the Internet use in the USA. In this regards, then, this move can be seen to be one that aims to allow growth of the Internet and its future innovations in the USA as well as globally. There is no doubt that the governing issues pertaining to the Internet is very important. Matsuura (2000) sums it this way:

"If Effective, Internet governance, develops a climate of certainty and security and will provide the incentives necessary for business and individual users to continue to make significant resource investment in the Internet Applications. In contrast, if there is a failure of governance, expansion of the Internet and its applications will be slowed as few parties will have the confidence to invest immediately in Internet activities." [50]

Klein(2002) is of the opinion that the "Ungovernability" issues of the Internet changed with the creation of ICANN.[51] He argues that:

"By putting in place all the mechanism needed for the creation, promulgation, and enforcements of regulation, ICANN makes effective Internet governance possible for the first time."

He continues that since ICANN makes global policies pertaining to the Internet, this gives ICANN's regulations a "legitimacy, accountability and equity" aspect to them. However, according to him these principles were not always upheld[52], and cautioned that through the use of the Domain Name Systems (DNS) which the Internet uses to

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[50] Jeffrey H. Matsuura, Internet Governance: To Find the Internet's Once and Future King, http://www.isoc.org/inet2000/cdproceedins/8g/8g_3.htm.
[51] Hans Klein, ICANN and Internet Governance: Leveraging Technical Coordination to Realize Global Public Policy, p193, The Information Society, 18, 2002.
[52] Hans Klein, ICANN and Internet Governance: Leveraging Technical Coordination to Realize Global Public Policy, p 204, The Information Society, 18, 2002.

connect root servers, there exists the possibility of the Internet's openness becoming limited even though it is aspects of this authority that ICANN uses for its rule makings[53]. Although this paper will not look at Internet governance, the comment can be made that the some of the structural concerns Klein has noted are intrinsic to the Internet. These allow the network flow that is the beauty of the Internet to occur. Any organization that takes on the management of the Internet will face these same problems what has to be done is to put policies in place now to avoid this. This is looked at briefly again in Appendix 1.

What these arguments show in a nut shell is that, should the Internet lack in its governing abilities, the end result of this will be "inefficient technological actions and chaotic business models.[54] Given the importance of Internet governance, an important issue is what form the must governance take. This is the concern of governments globally who have on one hand the well being of their citizens and their protection and on the other the need for freedom to have access to all that the Internet makes available by way of unlimited information and access to communications. With this access, all kinds of rights are open to challenge as new definitions arise. One such is human rights. Raboy (2005), sees communications as a human right. However, he recognizes both the importance of governments balancing as a protective mechanism what their citizens are able to see, hear and understand from the Internet taking into consideration cultural perspectives against the freedom that this new media which provides an open form of access to a wide range of information.[55] This sentiment is shared by Saleh

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[53] Hans Klein, ICANN and Internet Governance: Leveraging Technical Coordination to Realize Global Public Policy, The Information Society, p205, 18, 2002.
[54] Jeffrey H. Matsuura, Internet Governance: To Find the Internet's Once and Future King, http://www.isoc.org/inet2000/cdproceedins/8g/8g_3.htm.
[55] Janice Arnold, New Mcgill prof advocates a critical look at media, The Canadian Jewish News, Jan 20 2005, http://www.cjnews.com/viewarticle.asp?id=5335.

Abdulrahaman al-'Adel, who sees a challenge in culture preservation on one hand and at the same time providing modern technological tools such as the Internet in traditional Muslim countries.[56] Levinson (2005)[57], however, believes that the Internet should be free of censorship regardless of cultural or political differences.

This challenge is not an easy one. The rate of government adoptions of mechanisms that facilitate use of the internet is a cautious one in Middle Eastern and African countries while it is rather open in Western, South American and some Asian countries. In this regards, then, governments of different countries also play a role in Internet governance through the policies and rules that they enact that direct the manner in which the Internet is used in their countries as well as by the legal structures that are in place to arbitrate legal disputes between countries internationally. Since governments have jurisdiction over the activities of their citizens, they in the end have the final authority over what how their citizens interact with the internet. Increasingly, what is happening is that countries or organizations within countries are joining up with each other to form regional groups for policy making as well as for the sharing of appropriate resources.

Internet service and product providers are also part of those providing governance by way of the manufactured products and services they offer. For the most part, this group is already part of the different international units. This is because their interaction and input, help to provide the standards and protocols that the infrastructure of the Internet

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[56] Human Rights Watch, The Internet in the Middle and North Africa: A cautious Start, http://www.hrw.org/advocacy/internet/mena/int-mena.htm.
[57] Bruce Levinson, Preventing a New World Internet Order, CircleID, Jan 18, 2005, http://www.circleid.com/article/899_0_1_0_C/.

uses. They also play a role in advising their governments over what Internet policy adoptions should be utilized for both technological and business growth.

Local Internet users and the general public are also a group that contributes to Internet governance and standards. These groups through ' appropriate use policies' for example, affect the way that Internet is used in organizations such as businesses or universities. The general public also contributes and participates in this process through policies such as what cable company a community should use, that they allow by voting for. These votes affect wide ranging issues that affect Internet use in their communities.

Increasingly, because of convergence and adoption of Internet standards, the lines between the traditional Telecommunications Services and functions are getting blurred. A phone can now deliver television and radio services in addition to telephony services while a television network broadcaster can deliver radio services. Everything is actually moving to a "network" pattern. In the network pattern that currently exists, several users subscribe to several different services from several networks,[58] and Olsson predicts that in the new network patterns that will emerge, there will be several users and user groups subscribing to several services but that the number of networks, will decrease[59]. He further predicts future services will be IP in nature and that wireless telecommunications will be the most prevalent access method.[60] Regulators will be faced with the challenge of putting all these disparate parts together to form fair and cohesive rules. This will involve taking into consideration all the different stake holders that telecommunications will affect.

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[58] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p18, John Wiley and Son Ltd, 2003.
[59] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p18, John Wiley and Son Ltd, 2003.
[60] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p18, John Wiley and Son Ltd, 2003.

Stake Holders

The Telecommunications Industry is a large one with a number of important stake holders. They are Users, network operator, service providers, suppliers, share holders, regulators.[61] These stake holders could further be classified by the type of policies that pertain to them. Frieden has the following classification that is given in Table 1.[62]
To provide a well rounded look at all the facets of telecommunication, Appendix 2 will look at some of the policies that randomly selected countries have implemented as their Telecommunications policies.

This section has briefly looked at the Internet's regulatory bodies and the stake holders that have interest in this sector from the perspective of how it impacts telecommunications as a whole. With regards to the USA, as regulatory bodies form rules and laws, these affect by association the discussed groups and the decisions of these groups affect by association as well the laws that are made. National organizations acting on behalf of their nations see to it that the laws passed in international proceedings are ones that will best suit their nationals and give them a competitive edge. By including these groups in this discussion here the paper brings to the laws and those for whom the laws are made together.

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[61] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p2, John Wiley and Son Ltd, 2003.
[62] Rob Frieden, Managing Internet Driven Change in International Telecommunications, p 6-7, Artech House, 2001.

Table 1 Stake Holders by Policy Type that Affects Them

Policy Type	Audience	Prevailing Factors
Political	Nation	National Availability of Service Investment costs irrelevant
Economic	Incumbent	Monopolistic Exclusive control of all service sectors
Industrial	Domestic Manufacturers Service Providers	Protection from foreign competition
Technology	Oligopoly	Distributed Enterprise
Social	Free Market	Universal Services , Market
Law	Regulated Monopoly Oligopoly	Regulates a monopoly Allows Market access
Treaties	International	Excludes competition
Foreign Relations	Less Developed Nations	High costs
National Security	Markets	Excludes free access
Labor Relations	Telecommunications sector	Employment in Telecom sector
Consumer Protection	Consumers	Fraud and deception prevention
Mergers/ Acquisition	Business	Protecting Competition

CHAPTER 5

LAWS PERTAINING TO THE DIFFERENT TELECOMMUNICATIONS SECTOR

Telecommunications innovations are rapidly occurring and the old integrated centralized media structures are changing. This change is seen in the equipment and the networks that are forming. The old terminals – ‘ dumb endpoints’ to the network- are now replaced by ‘semi-nals’ –intelligent nodes that can process, switch, store and retrieve information using only a small percentage of the space that previous switches used. In this regards, the Telecommunications Industry is experiencing fragmentation. At the same time the function of these nodes work together to process and move divergent information types which are delivered as a cohesive whole in digital systems that use bits. In digital systems a bit is a bit whether it represents a hiccup, in a voice conversation, a digit in a stock quote or a pixel of light in a rerun of Television show and this is convergence. [63] Convergence makes the effect of bit and packet technology apparent as everything is made “similar”, processed and then given its original identity again.

Although Telecommunications and the Internet and its ensuing services are similar in that they use the same technology, the law treats them differently. In fact, both have evolved in such a way that it is hard to differentiate between the technologies that both use. The Telecommunication Industry has sections of it regulated, while the Internet and it related services are not. Although this is not quite pressing at the moment, one of the questions that convergence will cause regulators and policy making bodies to deal eventually is what is a subset of what? Has the Telecommunications Industry become a subset of the Internet or is the Internet a subset of the Telecommunications Industry?

[63] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p4, Oxford University Press, 1997.

This question is important because although the Internet and ensuing bit technology is currently a deregulated sector of the Telecommunications Industry, it is imperative for its use within the USA, that it clearly defines its place in the laws of this nation. Its current ambiguity may cause it to experience problems. An example of this is given by Huber's arguments. He argues that although the press is covered under the First Amendment of the United States laws and therefore has freedom in what is printed this does not apply to telecommunications. Huber (1997) writes:

" …The First Amendment does not apply – or at least not quite so clearly courts of this century have said - to photon, phosphor or fiber optic glass. For electronic media, franchises, licenses and permits remain the norm." [64]

Here Huber is attributing to the fact that if certain sectors are not regulated with "franchises, licenses and permits" - instruments such as he has mentioned, then the technologies of this sector as he has mentioned them and by extension this industry is (or will) not be covered by the First Amendment. If the sector is not covered by the first amendment, then his assumption continues that they are not sheltered by the laws of the USA. Furthermore, the presumption is that if this is the case as outlined, that this industry is not under the umbrella of the laws. By extension then, if this is scenario is equated with Internet technologies and telecommunications, then, the Telecommunications Industry as it is evolving with its bits etc, cannot be or is not protected under the law, nor can it enjoy the freedom that the press enjoys. This however, will be a fallacious presumption. This is because the argument can be made and the fact remains that since the Courts recognizes the Telecommunications Industry, then all facets of it are immediately recognized as well. The fact also remains that since

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[64] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p35, Oxford University Press, 1997.

the Court go as far as to formulate regulations for this industry, then it is immediately covered under the protection of the law and in that regards then, this industry enjoys all the rights, freedom and privileges that this recognition brings.

This short discussion shows the conundrum that the ‘new’ Telecommunications Industry is up against. The problem it faces is not just about defining how sections of it get treated with policies it is in the long run about maintaining its identity intact given the dramatic changes in the technologies it uses.

With regards to the different factions of the industry, the intra-industry challenge is first of all that of providing equity and comparable regulatory standards. I will at some of the sectors that are currently in this discussion of disparate regulatory standards briefly now and isolate the similarity in the law between them in later chapters.

Cable

According to Huber(1997), the “.. Courts have [also] now established that cable operators unlike broadcasters have real First Amendment rights.” [65]

However what this recognition and hence new regulatory status brings with it, is that Cable operators now have to contend with issues of reality. He cites the case of PCI against the City of Los Angeles. Prior to this case, there was only a single exclusive cable franchise for each major area of the city. The courts ruled that exclusive franchise was unconstitutional and that cities could have two franchises in an area.[66] This verdict though can still be seen by some as a form of monopoly structure still in place.

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[65] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p60, Oxford University Press, 1997.
[66] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p60, Oxford University Press, 1997.

However, this is an area in which regulators have to make some decisions. One of the questions that regulators will have to consider are whether the old paradigms that are being changed are in fact in some instances the most appropriate form of regulation? Is a 'monopoly' structure still an efficient policy tool even as things change?

Essentially this is what the courts have allowed in the PCI case. If this form of monopoly regulation is still viable when can it no longer apply? In the case of radio for example and early telephony, the technology at the time made regulated monopoly structures an efficient tool that allowed for the growth of the industry and the economy as well as took into consideration societal factors. This is because investment costs were taken into consideration by those regulating then. It was expensive then to lay down telephone lines. It is still expensive now to lay down fiber optics with estimate as high as $1,000.00 per household. Given that this is the case, what is the point at which regulation as opposed to deregulation is appropriate? This is a discourse that must be examined for decision making purposes pertaining to the industry in the future but which this paper will not analyze.

Another problem is that the present technologies are 'affecting' the convergence of broadcasting, cable and telephony by merging them and thereby emphasizing their similarities rather than their differences. In the past, for example, the technologies used by telephony and broadcasting were considered sufficiently different to regulate the former as wired technologies which were different from the wireless technologies of the latter. Huber(1997) explains this difference of the past in technology format as follows:

" The Original broadcasters were farmers. The word is in fact, centuries old. To broadcast seed is to scatter it over the whole surface of the earth. The alternative is drilling, where seeds are planted in rows. The 1934 Act understood these two paradigms and embraced them. Telephone was wires and wires drilled. Broadcast was wireless and wireless landed everywhere," [67]

These paradigms as explained by Huber cannot hold in today's reality. This is part of the problem of regulating present telecommunications sectors and it contributes to the Intra-industry problems of this industry. In the regulations of the Cable sector, the Cable Act of 1984 codified what FCC had already allowed by way of regulations. This was that only up to 5 % of cable revenue could be used by local regulators. [68] On the other hand, taking into consideration similar technologies, this is not the same method of regulation that holds for telephony providers. For telephony operators, their form of regulations depends on whether they are classified as Telecommunications Service Providers as opposed to Information Service Providers. Each of these two classifications is in turn regulated differently. Although all these groups of telephony providers are technically due to convergence 'Internet Service' Providers, there is an inconsistency in regulations that pits incumbent who are Telecommunication Service Providers, and who are regulated using 'traditional' regulatory methods against the new entrants who are given respite and therefore not required to be obligated to certain state regulations.

A reason for this inconsistency in the traditional methods of regulating the incumbents as opposed to cable and the new ISP entrants grew from the notion that the electromagnetic spectrum was in limited supply and that it belonged to all at the start of telephony regulations. With cable and emerging satellite technologies, some commentators like Huber (1997), however feel that the opposite view is now prevalent

[67] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p19, Oxford University Press, 1997.
[68] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p52, Oxford University Press, 1997.

as more spectrum bands were available and that this explains the deregulation of cable as well as the new telecom sectors such as Satellites. He notes:

".. What ever one might say about spectrum, there was nothing inherently scarce about metal wire wrapped in plastic. Regulating wire because spectrum was scarce had it exactly backward. Cable marked the end of scarcity. Deregulating cable would replace scarcity with abundance. [69]

This is another instance in which the regulations of the future will have to pay attention to. The availability of more spectrum bands for communications that new technologies are using are working with very high frequencies and for example operate at the 2.4 GHz frequency[70]. This is the Super High Frequency (SHF) range and can be regarded as infrared ray range. Currently, the effects of using this rays and bringing them into the earth's atmosphere is still not known. Until they are certified as safe in this regards, then the spectrum can still be regarded as being scarce. If they are so regarded, then telecommunications policies must be enacted for the protection of this resource and its effects on things of the earth.

[69] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p58, Oxford University Press, 1997.
[70] American Best Computing, Wireless networking, http://www.mitsuba-ga.com/wirless.html.

Wireless (Cellular Technology)

Cellular telecommunications is radio telephony. The Cellular Telephony Industry is a $30 billion a year industry. It uses low power short range devices that allow the use of the same frequency over and over. In this technology, a city is partitioned into cells each with its own transmitter and like an 'infectious cold', cellular capacity can be made to expand by decreasing the size of the cell and increasing the amount of transmitters. Cellular phone service was approved by the FCC in 1981 and by 1995, there were 25 million users[71] Television and Cellular Telephony use the same broadcast technology with TV using 6MHz and Cellular Network using 25MHz.[72] Cellular technology is not regulated. Like the satellite providers they are told to do whatever they like with their systems. They like Subscription Television, Satellite, Video, dialtone, Cable are not seen as broadcasters. [73] Even though they are not seen as broadcasters, these different wireless service providers are administered by the FCC. Regarding wireless, the 104th., Congress also wrote in 1996 Communications Act in Title(VII) SEC. 704(7)'(A).:

"…Except as provided in the paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities"

In this regards, they were made subject to state and local laws. However, although the State and local authorities had jurisdiction, they were still subject to the FCC's final decisions as is seen in Title(VII) SEC. 704'(7) '(B) '(iv) of the 1996 Communication Act:

"… No State or local government or instrumentality thereof may regulate the placement, construction and modification of personal wireless service facilities on the basis of the

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[71] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p68, Oxford University Press, 1997.
[72] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p68, Oxford University Press, 1997.
[73] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p69, Oxford University Press, 1997.

environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions"

The status of wireless Telecommunication Service Providers as common carrier has been enhanced by the fact that they are now also in the business of providing video based services and as such they are therefore regulated under Title III. This is seen in the 1996 Communications Act in Title III SEC 651'(a) (1):

" … To the extent that a common carrier(or any other person) is providing video programming to subscribers using radio communications, such carrier (or other person) shall be subject to the requirements of [T]itle III and [SEC]tion 652…

The above sections of the Law Code document an inconsistency that exists in the intra-telecommunications regulatory climate. Although wireless telephony providers are in reality classified as common carriers they are not regulated as incumbent wired telephony common carriers and the regulatory requirements for the two different sectors are different.

Direct to Home Satellite

The 104th Congress in Communications Act of 1996 mandated the FCC's jurisdiction of the over Direct-to-Home Satellite Services when it wrote in Title(III)SEC 205 (b)'(v), the following:

"…Have exclusive jurisdiction to regulate the provision of direct-to-home satellite services. As used in this subsection, the term 'direct-to-home satellite services' means the distribution of broadcasting of programming or services by satellite directly to the subscriber's premises without the use of ground receiving or distribution equipment, except at the subscriber's premises or in the uplink process to the satellite."

Furthermore in the US Code, Title 47, Chapter 6, subchapter 1V, sec. 741, Satellite carriers were given Common Carrier status and this places them in the same category as incumbent telephony carriers. Although this is the word of the law, the reality is that

Direct-to Home Satellite service providers operate in a deregulated environment as opposed to Wired Telephony providers who are regulated.

Mobile:
With regards to Mobile Cellular services in the US Code Title 47, Chapter 5, subchapter 111, Part 1,(c)(1)(A):

" A person engaged in the provision of a service that is a commercial mobile service shall, insofar as such a person is so engaged, be treated as a common carrier …."

Cleary here again, the stipulation is made that Mobile Cellular services are a common carrier providers but they are also a deregulated sector of the economy.

Microwave

Microwaves are defined in the 18.50 to 2200 MHz bands. In US Code 47, Part 101, Subpart A, Section 103.1 a microwave service is defined as:

"… A common carrier public radio service rendered on microwave frequencies by fixed and temporary fixed stations between points that lie within the United States or between points to its possession or to points in Canada."

As can be seen here, the microwave sector is listed in the laws as part of the common carrier technologies and as such should be a regulated industry. The reality how ever is that the microwave sector as part of the satellite sector is unregulated.

From the definitions given above for the different telecommunications sectors by the Law, it can be seen that the common thread between all these services, is that they are all common carrier based services and as such implicitly governed by the rules that pertain to common carriers and hence should be regulated as such. The present argument in the Telecommunications Industry is that all these services should therefore be regulated similarly. This is actually saying that the terms that guide

Telecommunications Services and Information services should apply to all, which is not the case right now. The FCC in Computer Inquiry I had stipulated that common carriers were subject to Title II regulations[74]. Those subject to Title II regulations as common carriers are therefore affected by the Unbundling Act of 1996. If these different sectors as just discussed, had been regulated subject to common carrier regulations (given their definitions in the laws), the inference can be made that although this is not currently the case, (as some sectors are not regulated), in actuality, the Unbundling act of 1996 pertained to them as well.

Consequently, then all these services are eligible for classifications as either Telecommunications Service or Information Service and providers of this service should be regulated under these classifications. Currently this is not the case. More importantly as will be shown later, if they are classified as common carriers, then they should all technically be regulated as telecommunications services and they should all be treated under the same guidelines as the incumbent telecommunications carriers are. In essence, this eliminates the need for the classification of Information service provider.

As a recap of this chapter, I have established that all telecommunications services in general can according to the USA Law Codes be basically mapped to a general 'common carrier ' classification and status. Furthermore, given they are all described in the US Title codes they are therefore as mentioned earlier, all subject to the First Amendment protection. Therefore it can be said that, it is by no mishap that cable is providing Internet services, nor is it by happenstance that telephone companies are now in the business of providing television, radio and Internet services. The laws that are in

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[74] Deborah Eby, Editor, Understanding Computer III, p10, Phillips Publishing, Inc, 1986

place and which have been incrementally built upon since the inception of telecommunications regulations made provisions for these occurrences.

For those requiring more information, Appendix 3 gives a recap of the history of Telecommunications Law in the USA. It gives a brief recap from the Wireless Ship Act of 1910 to the Chain Broadcasting regulations of 1941. The next chapter will start by looking at the laws that have affected the communications industry since 1950. This will provide an introduction as well as a background for discussion of the silo and horizontal models of regulations that follows in subsequent chapters that will analyze the arguments by made Whitt (2004) on this topic in some detail.

CHAPTER 6

A BRIEF HISTORY OF TELECOMMUNICATIONS LAW

This section will briefly look at some of the laws that have been enacted by the USA Congress or implemented by the FCC that directly affect the Telecommunications Industry. The section starts with the history of the 'invention' of cable technology and gives a background as to why the regulations of cable and newer telecommunication technologies have evolved the way they are currently.

1950's -1980

In the FCC's Sixth Report and Order of 1952, the Commission, added 70 television channels in the UHF frequency band[75]. Right up to the 1970's, UHF was considered to be a technically inferior. This was because the technology available at the time put UHF waves at a disadvantage to VHF waves in distance the waves could cover, and in the picture quality that viewers received. Even though the FCC tried to assist UHF licensed stations by allowing them to use more power, and even succeeded in getting Congress to pass regulations that required manufacturers to include UHF tuners in their television receivers this did not help UHF television stations and their numbers declined while their owners lost money[76]. However, by the mid 1990's, with improved technology, the number of UHF stations in the USA were more than that of VHF and by 1997 there were 630 UHF station broadcasting.

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[75] Head, Sterling, Schofield, Spann, McGregor, Broadcasting in America, Eight Edition, A Survey of Electronic Media, 1998, p45, Houghton, Mifflin Company.
[76] Head, Sterling, Schofield, Spann, McGregor, Broadcasting in America, Eight Edition, A Survey of Electronic Media, 1998, p46, Houghton, Mifflin Company.

The outcome of the allocations that the FCC made in the Sixth Report and Order of 1952, meant that some areas could not get and television services. To offset this and meet consumer demands, some television stations operated signal extenders which were a type of wave repeater that strengthened television signals and made these available in areas which would not otherwise have it. This was the start of CATV later to become cable television, which delivered the television signals to the houses of consumers. The early cable stations used microwaves relays in their retransmissions and the FCC saw their efforts of 'redelivery' as one not meriting regulations as these stations were not 'transmitting'. This is an instance that shows the challenges the FCC faces in trying to regulate new technologies from their public good mandate while using information on the technology that exists at the time which may not always be complete.

In the face of growing complaints from stations who saw cable as a competition, in 1962 the FCC started to regulate cable by using microwave relay license for those stations that imported television signals that were not local and later in 1966, this regulation was applied to all microwave signal redeliveries. The FCC also ruled that all cable stations had to abide by the Must-Carry rule which meant they had to carry all television stations in their signal coverage area.

In 1972, the FCC restricted cable to ancillary support role in television but in 1977,cable won an appeal that negated the FCC's decision that it was supplemental and not equal to broadcast television.

1982 to 2005

Satellite providers according to law of 1982, could decide for themselves who they were. They could opt to become carriers and provide transport. Satellite Master Antenna Television (SMATV) also known as private cables uses satellite dishes in its transmission efforts and the FCC has deregulated the provision of dishes used to transmit satellite. To encourage growth in this sector, the FCC has made it such that satellite licenses are easy to get.[77] A concern that Huber (1997) has expressed is that satellite content is not regulated either. This is a common misconception but this is really not the case since as a common carrier provider they are subject to the rules of Title 47 and the decency laws that it embodies. In fact, all common carrier providers are subject to these rules. This misconception is also usually applied to cable. Although some believe that cable is not subject to the same scrutiny as network TV or radio in the area of adult content, this is not the case. This is because cable services and satellites services as a subset of cable, are regulated under Section 503 of the 1996 communications Act as well as under The Title 47 laws under Section 559.

The reason Satellite's content is usually perceived as not regulated is because the Reagan administration decided not to call satellite broadcasters by the term "broadcasters",[78] even though the footprint of satellite covers one third of the world. The Regan administration decided they did not have to become broadcasters and the court upheld this and the FCC ruled that programs that were not completely supported by advertising were ruled as non-broadcast service. For Satellite providers then, even though as common carriers they 'broadcast' channels, it is not termed as a

[77] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p65, Oxford University Press, 1997.
[78] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p65, Oxford University Press, 1997.

"broadcast".[79] Satellite providers as providers of subscription video services are known as 'privatecasters', 'narrow casters' or 'unbroadcasters'. [80] These terminologies though may not currently be valid. This is because there is hardly any part of this sector that broadcasts that is not supported by advertising. As a result of this, it may be that the decision making bodies may want to reconsider the measuring factor of not being completely supported by advertising as a regulatory criteria again.

Telephony laws in the past 50 years have primarily been shaped by the Computer Inquiry Laws as well as the 1996 Communications Act and the FCC's Triennial Report of 2003. With the Computer Inquiry II of 1977 and Computer Inquiry III of 1986, incumbent telephone companies were made to unbundled their networks, and give basic services to competitor by using tariff rates. Competing phone companies were allowed to interconnect to the public networks of the phone companies and The FCC incorporated an open network architecture standards that allowed easy interconnection among service providers at many levels.[81] In 1992, telephone companies were allowed to provide video by phone to their subscribers.

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[79] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p66, Oxford University Press, 1997.
[80] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p67, Oxford University Press, 1997.
[81] Peter Huber, Law and Disorder in Cyberspace, Abolish the FCC and Let Common Law Rule the Telecosm, p82, Oxford University Press, 1997.

More changes were seen in the telephony and cable sectors with the Communications Act of 1996. With this Act, cable carriers were allowed to compete against local broadcasting companies. Also long distance carriers like AT& T were allowed to compete in in-state toll call markets that were previously for the local Bell companies. Furthermore, local Bell Operating Companies were allowed to compete in long distance markets and wireless providers could use licensed spectrum without state or FCC regulation once they purchased a spectrum.

The truth of the matter is that too much went on in the Telecommunications Industry too fast. The age of innovation provided technologies faster than the Laws could 'digest', understand and contemplate on them. In a way this resulted in inconsistent understanding of what the rules were trying to do. The new policies that were developed provided in some instances to be inadequate or inconsistent. This resulted in lawsuits and providers and PUCs tried to operate within the limits provisions of the Law.

New policies do not only affect the industry they are supposed to regulate they also affect the total economy of the nation. This is true of all nations in general. In the case of the USA, the policies that it makes are of great importance because they have not only national and domestic effects but the also carry with them international significance. As a result of this the policies that this nation makes with regards to telecommunications are studied and help formulate international policies in this industry.

The policies that are made therefore carry great and significant consequences. Models have been suggested and imposed on the USA ‘s regulatory scheme to try to find out how it functions and how it could be modified or improved upon. To date the Silo Structure had been the main policy model. This is now changing. The next four chapters look at some of the newer models to some depth. The work of Whitt (2004) is used as an outline for this analysis.

CHAPTER 7

MODELS OF TELECOMMUNICATIONS REGULATIONS (PART 1)

As many try to understand the current changes in telecommunications that is taking place, several authors have tried to give their representation of the specifics of these change in different models in hopes that these would help regulators understand the problems as well as easily identify solutions for effective policy implementation and productive future rule making. In this and the next three chapters, I will look at the telecommunications networking models that have been postulated and during this study, I will analyze to some extent the work done in the 2004 article by Richard S. Whitt in which he elaborates on a new model for regulating telecommunications issues. This will serve as a prelude to the analysis that I will give in later chapters of this paper. I have looked at Whitt's paper at some depth because he has made of number of valid arguments that from a technical stand point, I found to be contradictory in some respects. This paper gives a different perspective to his arguments from the point of view of the technology involved. The first of the four sections will start by looking at general networking models in telecommunications.

Networking Models in Telecommunications

In giving an interpretation of what is currently happening in telecommunications, Ayish (1998) has proposed a model tries to connect the language of the new technology with the economic effect its carries with it. Convergence is described in this instance as the "increasing interoperability and connectivity among various technological components of a single communication system. " [82] Convergence according to Ayish, carries with it,

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[82] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 143 The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

implications pertaining to not only to technology, but also to the business and economic interests as well. It signaled the start of the of the digital era and as epitomized by the digital chip, has resulted in a bewilderment, and "dulling" of the lines between mass communication and the Telecommunications Industry as well as within the telecommunications services.[83] Furthermore according to him, digitizing information has allowed computers to be integrated into telecommunications services distribution. Telecommunications is now standardized into a "single" common language of digital signal processes. [84] This most important aspect of this 'language' is that it allows for instant connectivity and interactivity and dialects of this "single" language have gone on to form the basis for the different protocols which telecommunications uses.

Of significance according to Ayish(1988) is that convergence has made the wages of qualified 'skilled' professionals globally comparable using the principle of the "Factor Price Equalization. Rule"[85] This is therefore something that is very important that regulators have to take into consideration when making regulation about services/aspects of manufacturing and production in their countries. As a result of advances in telecommunication, the production process can be done in several different

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[83] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 144, The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.
[84]Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 144 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.
[85] Lester Thurow, The Information –Communications Revolution ad the Global Economy, p23, The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

locations and not necessarily in one. The Factor Price Equalization Rule is explained by Thurow, 1998 this way:[86]

"The skilled workers of Japan can effectively work with he unskilled workers of Thailand, and as a consequence the unskilled workers of Japan can no longer get a premium by virtue of the fact hat they work with the skilled workers of Japan, or the higher capital intensities available in Japan. The principles of what economists call the 'factor price equalization rule' are that those with developing world skills (the unskilled in America?) will be paid developing world wages even if they live in the developed world. Conversely, those with developed world skills (Indian software engineers) get something very close to developed world wages even though they live in the developing world. For those with skills in the developing world, wages rise, and for the unskilled in the developed world, wages fall. "

Regulations then of the Telecommunications Industry which I have described as an Infrastructure Industry carries with it as seen in this instance huge ramifications for the small business and small factory landscape as well as for the highly skilled technical sectors of the economy. These new demands carry with it the balancing act of maintaining internationally the even-handed perception of the USA's regulatory climate while at the same time building up on its competitive edge so as to take care of its business of maintaining a healthy and growing national economy.

Salof-Coste,(1998) contribution to this discourse is in the description of a model for the networking process and the effects that convergence brings to the international arena as part of a historical approach. According to Salof-Coste, because of the speed of present day evolution in telecommunications and information there is a lot of specialized yet interdependent knowledge that has to be assimilated versus the traditional "precise" and "sectored" knowledge of the past. Even though the old knowledge is still part of the new, changes occur at such a fast rate, that changes must now be dealt with on a

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[86] Lester Thurow, The Information –Communications Revolution ad the Global Economy, p23, The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

“reflection-action” approach. Salof-Coste further compares the new changes to a “great wave” with a “fabulous source” of energy which even though, there are a catalog of formula for the changes that have been “provoked”, the formula are usually old by the time they are prescribed. Of particular interest is his representation of the telecommunication era. He has denoted that the interactive nature of telecommunications, as is seen in the services that are offered online instantaneously now is built around a ‘holistic’ way of thinking and in which reality is seen as a ‘complex fabric of interactions’.[87] He further writes:

“There is not however, only one reality in a unique and homogenous time space but a multitude of fields of reality, each with its own specific space and its own specific time.”

Others aspects of this new era are that traditional method of trading have changed from the predominant use of money to barter. He notes that although rational thought is not rejected in this new era, it is not in the same manner as that of the industrial revolution era where it was for clarification purposes. Now, rational thought is part of a whole and as such it allows individuals to become both receivers and senders and not just either. The networks of this era are linked by their ‘sensitivity’ and this is how reality is identified. In the telecommunications era, since it is an ‘organic’ era, a new way of identifying reality is given by having an understanding which identifies not only the groups and their abilities but the pathogens of that group.

Another large scale networking model is the International Aggregation Model (IAM). IAM is an international digital network with a fiber optic architecture of regions that emulate

[87] Michel Saloff-Coste, The Age of Creation and Communication, p193, The Information Revolution and the Arab World, Its impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

an international telecommunications network.[88] It is used by the South East Asia, Middle East, Western Europe SEA-ME-WE2 fiber optics networks.[89] It has been proposed by Nuruddin (1999) that participation in this network may present a impetus for a regional network structure similar in nature to that which is occurring in Africa.[90]

Nuruddin (1999) has also typified the telecommunications network used by African nations as Multilateral Large Scale Models. This is a network model that is tied to politics and to the whims of political leaders. He classifies the model used by Panaftel in Africa as belonging to this group.[91] He suggests that for telecommunications growth in Africa, a more appropriate model that can be used instead is an Appropriate Environmental Model (AEM). This model according to him, will separate the telecommunications providers from the government of African nations, while allowing for the installation of new technologies that will aid the expansion of domestic networks.[92]

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[88] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p268, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[89] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p268, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[90] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p268, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[91] Mansur M. Ruddin, Mofels for Development of Regional Telecommunications Networks in Africa, p263, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[92] Mansur M. Ruddin, Mofels for Development of Regional Telecommunications Networks in Africa, p270, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.

Another type of model classification for telecommunication networks is that of Noam (1999) who has identified 3 types of networks that are global.[93] 1) Cost Sharing Stage Networks, which are government subsidized networks with costs sharing. These networks are easily affected by political instabilities which slow rate of service development.

2) Redistribution Stage Networks, are networks in which there is usually a monopoly carrier and the network's growth had taken place due to political regulations.

3) Pluralistic Stage Networks are ones in which the network structure is made up of sub networks. These networks may not be more technological advanced than redistribution networks. In general, network growth Noam concludes are from cost sharing to pluralistic ones.

The phenomenon of trying to understand the new aspects of telecommunications has affected both developing and developed countries. For most of the developed countries they are faced with how to merge the new changes in telecommunications with the old and traditional realities of the past that they are for most part settled in. For Asian nations in general the merging process has not been as much of problem as the new technologies provided a new avenue for growth in areas that this had not been the case. In western developed countries however, especially in western industrialized nations, countries are trying to find the most appropriate method of regulating their Telecommunications Industry so that it has with it, a continuity that reflects not only the

[93] Eli Noam, Introduction, Telecommunications in Africa, p8, Oxford University Press, 1999

new and fast changing but also the old. One such nation is the United States of America.

Taking into consideration what was happening technologically in the field of telecommunications, in 1996, President Clinton of the USA signed The Telecommunications Act of 1996, which ended the barriers that had been maintained in the different kinds of Telecommunications services – such as local and long distance, wireless, cable television and broadcasting. It was hoped that this relaxing of the laws pertaining to telecommunication will result in growth in the industry that some had seen as stagnating as its policies that regulated it were not in line with the newer technologies.

The changes in telecommunication did not occur in the USA alone. In 1987, Japan's Nippon Telegraph and and Telephone Corporation (NTT) sold $15.63 Billion in shares publicly while, the German Deustch Telekon, sold $1.3 Billion in shares.[94] In 1998, Ayish predicted that an outcome of the Telecommunications Act of 1996, would be the formation of mergers as "information technology outfits raced into each other's businesses."[95]

In the USA, the regulatory climate has engendered and generated a lot of industry as well as legal discussions and actions. Some have questioned the efficiency of the

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[94] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 145 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

[95] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 146 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

regulations made. One such scholar who has questioned the current regulatory regime in the USA is Richard Whitt.

Silo Representation of the Law

According to Whitt (2004), in the United States of America, the current legal system faces a problem about how to regulate the Internet as well as IP based components such as applications, facilities and services and he warns that tying to force the current legal system to regulate these components will be " a flawed, damaging and ultimately doomed approach."[96] Whitt bases his arguments and the hypotheses of his paper around packet –switched data communicating networks using primarily two models. These are the Protocol Layering model which assumes that control for each layer of a protocol stack are built into the rules or protocols of a particular layer in the stack and the End to End Point model which assumes and uses the concept of a network that is 'dumb' – in that the network itself lacks intelligence, with the intelligence resting in the applications that use the network. He notes that the Layered protocol network uses IP as its core, and that together these two models are the foundations of the Internet which is being widely used globally.

He further notes that the U. S. regulatory system however, uses a method of regulating by way of the 1996 Communications Act in which the rules that segments the telecommunication industry for policy making are based on "traditional service, technology and industry labels"[97] He lists theses as " wire line telephony service,

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[96] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p590, Federal Communications Law Journal, 56, May 2004, Number 3.
[97] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p590, Federal Communications Law Journal, 56, May 2004, Number 3.

wireless telephony service, cable television service, broadcast television and radio service and satellite services".[98] His contention is that this form of classification makes a supposition of fixed and unchanging services or networks when this is not the case. This inflexibility in the manner of implementing regulation as well as in the laws themselves brings with it according to Whitt an "all or nothing thinking" and an ensuing "silo" or "bucket" "vertical" legal structures. Since these legal structures do not have a correct fit with the horizontal features of the protocol layers they are trying to standardize and regulate, there is an impasse situation between policy makers who have not taken into account this fact. He ascribes the cause of the impasse situation to convergence- the merging of telecommunications markets and the computer networks and information technology industry.

The effects of this convergence he notes are readily seen when regulating the Internet and when Internet issues arise. Policy makers are unable to provide any suitable regulation in this area because the Internet does not restrict and impose limitations and boundaries although it has within it a strong regulatory dynamics which is inherent in it. His contentions here are that the present laws are based on, and regulates on services and service markets, while the internet is based on technological difference – ability differences.

As I see it then, the questions this implications raise are: Is this the case though? Is it possible to see ability and technology differences in aspects of the Silo Model as well? If this is the case how will these be recognized?

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[98] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p590, Federal Communications Law Journal, 56, May 2004, Number 3.

Continuing with Whitt, he notes that the end result of this improper fit, is that the current ill fitting regulations, not only restrict creativity but is also short sighted in that areas that are concentrated and which should be regulated are overlooked. To rectify this problem, Whitt recommends that policy makers should move from the current vertical Silo Model to a method that uses the horizontal network Layers Model instead.[99]

This is because according to Whitt, the laws must be built around the Internet rather than allow the Internet to conform to the current regulatory environment. Here, he has reduced all telecommunication services to be IP related with IP at the center of his model. He then goes on to recommend that for policy analysis, there should be developed a market model which will revolve around the IP center rather than the top-down or bottom-up approach of the Silo methods. Essentially, his model will take the layers of the Silo Model which are now vertical and replace them with the horizontal layers of the model he is proposing. Further more, he believes that the model that he has suggested should be extended to manage and form policies for both the unregulated E-commerce as well as the "regulated" telecommunications space.[100] To me, this suggestion asks following questions for which his analysis did not provide satisfactory answers: In what way is the Silo Model deficient? In what way is the current market model not serving the Telecommunications Industry and Internet ? How and why is the horizontal Layers Model better than the Silo Model?

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99 Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p591, Federal Communications Law Journal, 56, May 2004, Number 3.

100 Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p592, Federal Communications Law Journal, 56, May 2004, Number 3.

In offering a different viewpoint to Whitt's assertion in this area, I will as a working start look at and provide some answers to the questions that I posed earlier. I will first look at the organizational structure of the FCC, the working Commission that is responsible for implementing the laws that Congress passes regarding the Telecommunications Industry in the USA. Examining the organizational structure of the FCC will be used as a proxy to show how the management of this agency is structured with regards to the laws. In this case, the emphasis is on structure which tells of the functional capability – or ability of the different units to perform satisfactorily the activities that are to be managed.

The structure of the FCC is given as follows:
A. the International Bureau - which deals with Satellite and international matters.

B. The media Bureau – which regulates AM FM radio, TV broadcasting, Multipoint Distribution (Cable and Satellite), and Instructional Television

C. The Wireless Telecommunication Department which regulates cellular and PCS phones, pagers and two way radios. This department also regulates radio spectrum – makes provision for businesses, local and state government, public safety providers, aircraft, aircraft, ship and individuals. It covers "amateur, cellular, paging, broadband PCS (Mobile Telephone services) and public safety."

There is little difference between cellular and broadband PCS' . They are similar in features(value added services, quality, coverage), and price. The difference is that cellular maintains analog service, while broadband PCS uses digital technology. With cellular a consumer may have access to phone service if they travel out of their home area. This law expires in 2008.

D. Wireline Competition Bureau – regulates telephone interstate communications, intrastate communications, and wire based transmission services.

E. Office of Engineering and Technology – Allocates spectrum for non-Government uses and provides expert advice on technical issues.

Also, it is to be noted that the Titles that govern the rule making in the USA are arranged by a vertical silo or functional entity format. Furthermore, Title 47 of the USA Code collection which is listed as Telegraphs, Telephones and Radiotelegraphs also has this format. Given that this is the case, the organization format that the FCC uses in its management in this case has an appropriate structure to deal with the issues that have been assigned to its care if the supposition is made only on how the laws are arranged and how they are administered from a structural perspective. In this regards there are tools and organizational structures in place that have as their mission the aim of providing effective rules and implementation policies for the units under their authority.

In the laws there are also "horizontally layered" rules that connect and affect all the different chapters in Title 47. One such rule is that all the rules in Title 47 are subject to the rules of Title II.   Another example of this horizontally layering and connection of rules is also seen in the cross-connecting of the general rules that pertain to common carriers.   In this instance then it can be inferred   that in addition to the vertical silo organization of laws, there is also in place a horizontal layering that connects the laws in the different chapters of the Legal Codes that allow for horizontal connectivity within the Laws.

The indecency and obscene specification in the law that affects all telecommunications in general is another example of the horizontal layering aspects of the law. Finally, these laws that are in the USA Code are all governed and protected by the First Amendment of the constitution which guarantees total freedom. Given this organizational arrangement of the law in both a horizontal as well as in a vertical manner, the questions of ability – functions of the law and how it is to be recognized which I posed earlier are answered.   If this is the case then it can be argued that the arrangement of the laws of the USA especially those that pertain to the Telecommunications Industry are not only vertical or silo structured but that they are also horizontally layered. To relate this to the Internet, the laws then are equipped to handle the 'nature ' of the Internet.   An assertion can be made in this instance that it may not be that the way the FCC currently regulates is completely different from what Whitt is suggesting.

This vertical stratification, has allowed the FCC to regulate communications services in actual fact by having a stratified whole in which each strata represents a functions of a particular communication service. Within each strata there are subsections as horizontal layers or details of aspects of the specified law for clarification. Each layer of the vertical strata then in the traditional FCC model can be seen in actual fact as a horizontal layer for further policy formulation and an area for which methods of implementation has to be developed. Also, the horizontal layers connect to other horizontal subsections in the different chapters of the law by the similarity of their implementation or definition. From a technology standpoint as well as from a policy standpoint, this may be an appropriate way to regulate. It may prove that this is especially appropriate for present day use as this is the same way in which the TCP/IP model and the OSI models were constructed. The supposition can be made that in actuality, the layers of the OSI and TCP/IP models of the Internet were structured after a 'best fit' of the Laws and that these computer rules/standards as currently applied - using protocols pertain to, and are patterned after both the vertical and horizontal layering and connections inherent in the Laws.

I will also argue further that the reason that this is not so apparent in the FCC regulations or that of the Laws of Congress is that in the implementation of the laws, the total 'nature' of the FCC format obscures it horizontal stratification in policy formulation while the Internet, with it horizontal protocol format provides in a more visible and easily recognized manner this form. As I will show later on, the laws of the Internet take into consideration the structure of the law and are in fact constructed in both a vertical and horizontal manner. Further more as I will also show later on, the inconsistencies in the law are due to the cautious approach the FCC uses in dealing with a rapidly evolving new technologies which constantly changes in telecommunications.

The technologies of the Telecommunications Industry use primarily electromagnetic waves. These are essentially, radio, microwaves, light waves and satellite waves which travel through wired broadband and baseband or wireless transmission that transport information in a communication in a digitized wave format over a network. In a network, there are components and devices which allow the waves to be used to transport information from one point to the other. The component devices actually 'encode and decode' the information on the waves. Although in the case of sound waves in general, the waves do not necessarily need a medium for transport as sound waves can and do travel through any and everything they do need a medium or a channel for effective communication, so that they can be appropriately used. With current technology different network devices allow the different types of waves to be digitized from analog format to digital format and if need be back to analog. This is the basis of all packet switching networks. In telephony, voice has a unique position in that it is both a medium, and an information carrier. In this regard, information is carried in the 'voice' medium which is then digitized and made part of the services that digital networks carry.

Currently the medium and channels are regulated by the telecommunications rules of the FCC. However, what is not regulated are the content of what is transmitted over the 'new' networks. Also, what is not directly regulated currently are sub sectors of the Internet and subsequently communications, such as E-commerce and other on-line services that this new technology has given rise to. Although some of the issues of the Internet will be looked at later in the paper, regulations of the Internet and its sub sectors will which will not be looked at in this paper. In the past, as seen in the examples from broadcasting and telephony, the FCC had regulated the ‘content’ of the radio transmission as well as the other medium and channels for radio transmissions. With the new technologies the onus on the FCC and other regulatory policy bodies is what should be regulated and how. It is not that there is not an appropriate structure or lack of ability for this regulation. Rather it is more of a problem of ‘how’ and in what manner this regulating should be done in so that the old and the new continue profitably in a market economy. Essentially, what these newer technologies do is encourage the FCC and other regulatory bodies and the Telecommunications Industry in general to go past a comfort zone they had been comfortable in. In doing this, this raises concern among some scholars. One such is John Havick. Concerns about how the Internet as a new telecommunications platform will ‘blend’ with already established political structures in society are highlighted by Havick (2000) who notes:

“…the hot Internet medium already projected to cause societal upheaval will stimulate activity in matters that are important to society. … political structures will feel the force of Interne communication. …Fragmentation, decentralization and upheaval will unravel the political process as it has been known for the last 200 years…”[101]

These are valid and extremely important concerns. However, I will make the argument that the perception that the Internet‘s existence will only cause havoc is not entirely accurate. In the case of society’s political process and the Internet’s place in it, the argument can be made that rather than cause problems, the Internet allows an equal dissemination of ideas to occur from all sides of a political debate. In this regards, information is made available as parties intend to tell their sides of a matter in the unabridged or edited form. This is not usually the case in other broadcast medium such as Television for example where broadcasters may be concerned with reaching a particular target audience or group only. Furthermore, there is more utility in the

[101] John Havick the Impact of the Internet on a Television-based Society, p283, Technology in Society, 22, 2000.

Internet than problems. The utility of the Internet was emphasized during the last number of hurricane disasters that affected the USA during the late Summer and early Fall of 2005. Several independent organizations using the structure of the Internet were able to offer services, food, comfort and housing to complement the efforts that the government and business organizations were providing from their independent sites. In fact this empathetic nature of the Internet is constantly utilized by different organizations and groups (especially in the past by churches and non profit groups) to solicit fund raising ventures. Globally, the Internet also ranks equal to broadcast television and newspapers in providing venues for group aid to areas distressed after natural disasters.

Another concern that Havick (2000, p283) expressed is that the Internet excludes an openness to ideas also encourages “individualism and decentralization”. This is an argument that can be made of television and print media also. This is because people will in the case of television [watch] or in the case of print media [read] what they relate as having values similar to theirs and their use of the Internet is no different. The advantages in fact that the Internet and new Internet related telecommunications technologies now provide is that in addition to the fact that there is a plethora of differing and varied views on any given topic, the Internet user can at any time obtain access to these information should they wish it. This is facilitated by the relatively easy availability options that include not only websites, but means through which access to the Internet can be made such as relatively inexpensive computers and Internet service provision. In the next chapter, I will look in detail at some of the specifics of the horizontal layered models that is discussed in the literature and specifically in Whitt’s 2004 paper. This is still a continuation of the models of regulations and the greater part of the discussion will center around Whitt’s argument.

CHAPTER 8

MODELS OF TELECOMMUNICATIONS REGULATIONS (PART 2)

In this chapter which is continuing the discussions of the concepts of telecommunications models that was started in Chapter 7, I will discuss as part of the literature several different models that have been postulated that are specific to the modeling of regulations by the FCC from the horizontal layers method perspective . This is essential to the discussion that will take place later about the details of the law and whether using the horizontal method of layering is better than the vertical Silo method. It forms the background as it ware for the details of this discussions. As the detailed discussion will show later these two methods from a technical stand point are essentially the same. If this is the case then the regulatory implications are significant as it will suggest that the newer solution is in actuality no solution at all.

Proposed Model for Horizontal Regulation

The model that Whitt has recommended would have four layers namely:

- Content
- Applications
- Logical
- Physical
    - Transport and access

According to Whitt (2004), using the layers of this model, public policy regulations would be able to:

- Prevent traditional grouping according to services, networks or industry.
- Separate the top layers from the bottom layers.
- Categorize and isolate pertinent public policy issue.
- Provide interdependence linkages information.
- Bring to light interconnections between networks and functional layers.
- “Focus selectively on curtailing pockets of market power within and between layers.”
- Preserve the “innovation commons” of the Internet.

His view is that this model will in turn allow for growth by leaving the two top layers unregulated while the lower physical layers would be discreetly regulated where market power exists rather than using legacy service or industry labels.

Further more according to Whitt, his four layers Network Model would have two functions:

1. As a tool, it would:[102]

- Not regulate services such as VoIP
- Regulate intra layers connection between networks only on the extent of market power within the layers
- Leave the Universal Services Fund contribution to be a lower layer matter
- Make the top layers independent of the bottom layer on issues of regulation

2. Also, Whitt's model would achieve the following regulatory goals:

- Minimize legacy as well as new "ISP" obligations
- Create a sustainable regulatory framework
- Justify federal preemptive regulations
- Concentrate regulatory attention on competition in the last mile physical issues

Although Whitt envisions his model as concentrating only on the lower layers for USF fund financing and regulations, since all networks now run on IP there is not going to be an easy way of making the USF issues only a lower layers issues.

The Law and the Silo Models

Whitt (2004) [103] continues that the current ill fit in the laws occurred because services and technology were considered the same. As a result of this, according to Sicker (2002) "vertically-oriented "regulations known as the "Silo" Model Method of regulating

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[102] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p592, Federal Communications Law Journal, 56, May 2004, Number 3.

[103] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p596, Federal Communications Law Journal, 56, May 2004, Number 3.

resulted.[104] The present traditional silo model structure as seen in the current law and regulations are in :

- Title II - Voice – Wire line Telephony
- Title III - Voice – Wireless Telephony
- Title III -Audio/Video – Broadcast, Radio/TV
- Title VI - Video – Cable Television

The reality of the situation in this instance is that although Whitt asserts otherwise, what the new technologies of the Internet underscores more than anything else is that this is the case and the fact remains that the technologies cannot be separated from the services.

Whitt (2004) continues however, that starting in 1960's, the FCC realized that convergence was occurring and that IP services while different from telecommunication's depend on them to function and that a new regulatory format was needed to allow the new computer industry to grow and this was done in Computer 1 reports. [105] In 1980, the FCC issued Computer II order and separated those services that are Basic Services which are regulated and Enhanced Services which are not. Basic Services were seen as those that provide capacity for information transmission. Enhanced Services on the other hand had 3 things. 1) The subscriber's information is changed by computers which affect the "format, content, protocol of the transmitted information. 2) The information is changed or restructured. 3) Stored information is utilized. [106] Furthermore, to prevent discrimination in how Basic Services where provided, Incumbent Local Exchange Carriers (ILECS) were required to 'unbundle' and

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[104] Douglas C. Sicker, Further Defining a Layered Model for Telecommunications Policy, http://intel.si.umich.edu/tprc/papers/2002/95/LayeredTelecomPolicy.pdf.
[105] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p597, Federal Communications Law Journal, 56, May 2004, Number 3.
[106] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p598, Federal Communications Law Journal, 56, May 2004, Number 3.

make provision for basic transmission services to all to Enhanced Service Providers (ESP) equally on an equal access basis.[107]

Whitt continues that the computer inquiry II rulings can be seen as regulating the communications network at the expense of the computer network so as to allow for creativity in this area. This move has been seen as a positive regulatory process for success (Cannon, 2003) as it adopts the horizontal layers format,[108] and a creative barrier less marketplace force (Cerf, 2002). [109] Werbach (2002)[110] also views this approach as flexible in adopting to changes even though it does not completely address all the issues that concern networks.

The Law and other Layers Models

Whitt has also discussed The Benkler Communication Systems Layers Model [111] which is a model that has 3 distinct Layer Levels. The model ends up is a model in which there are three levels of applications layers over a network and a physical layer. When the layers are stacked up they end up as follows from top to bottom:

Application Layer
Application Layer
Application Layer
Network Layer
Link Layer
Physical Layer

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[107] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p598, Federal Communications Law Journal, 56, May 2004, Number 3.

[108] Robert Cannon, The Legacy of the Federal Communications Commission's Computer Inquiries, p 55 Federal Communications Law Journal, March 2003, Number 2.

[109] Vinton G. Cerf, May 20 2002, http://global.mci.com/us/enterprise/insight/cerfs_up/issues/broadband_letter.

[110] Kevin Werbach, A Layered Model for Internet Policy, 1,Journal of Telecommunications and High Tech Law p 46-47, 37, 2002.

[111] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p610, Federal Communications Law Journal, 56, May 2004, Number 3.

The Telecommunications Act of 1996, Whitt (2004) continues is a move by the FCC towards a more horizontal layers approach by identifying Telecommunications Services versus Information Services while also encouraging "advanced Telecommunications capability "[112], that uses any media or technology. These capabilities are given as " voice, data, graphics and video". He continues that even though SEC. 251 of the 1996 Act, allowed for unbundling by opening up the networks of incumbent telecommunications carriers so that others can access it, and SEC 271, stipulates the conditions under which Bell Operating companies and their affiliates may provide InterLATA services, he laments that for the most part, the 1996 Act contains the same pre-existing vertical boundaries that assumes distinct services working over distinct infrastructures using distinct technologies when this is not the case[113].

He further shares the opinion of Nakahata (Whitt, 2004, p612) that the 1996 Act is merely a beginning in effectively using communication laws as a regulatory mechanism among different mediums.[114] This is because according to Whitt, the FCC is still using the parts of the Computer Inquiry proceedings in its rule making processes and that these are vertical based. He gives as an example of this type of vertically based regulation the fact that the FCC continued to allow BOCs to have transmission capacities for their Enhanced Services under the same competitive terms as the ESPs, at the same time however, the FCC continues to use the Computer Inquiry rules to ensure that the BOCs allow ISP open access to their local exchange services by

[112] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p611, Federal Communications Law Journal, 56, May 2004, Number 3.
[113] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p611, Federal Communications Law Journal, 56, May 2004, Number 3.
[114] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p612, Federal Communications Law Journal, 56, May 2004, Number 3.

regulating them.[115] Furthermore, in 2001, according to Whitt, the FCC still maintained vertical structures by emphasizing that ESP's have access to the transmission services of facilities based carriers in an open manner. [116] As a counter to Whitt's argument it can be noted that in the Computer Inquiry III, the FCC explained why AT& T were precluded from offering enhanced services at first. – This company had an antitrust consent decree in effect. [117] The FCC also explained its views on "Hybrid" services by writing:

'"Hybrid" Services, which we defined as offerings that combine"[r]emote [a]ccess data processing and message-switching to form a single integrated service, were to be treated as either data processing or communications services based on Commission determinations as to which of the two functions were predominant in a particular hybrid service[118].'

The FCC later acknowledged that it had erred in its regulation and wrote in Computer Inquiry III:

"After Computer I took effect, the technological and competitive developments in the communications and computer industries exposed shortcomings in its definitional structure, and in particular its ad hoc approach to evaluating the "hybrid" category." [119] … This was due to changes in consumer request, as well as technological changes in the data processing and communication industries that had caused a blurring of the distinct lines that had originally existed. To correct this problem, what the Commission then did was to implement a new set of regulatory definitions that had two service categories. These are the Basic and Enhanced services. Basic services were given as the ILEC's medium and technologies that facilitated information movement only. These continued to be regulated under Title II as the Commission regarded them as traditional[120]."

However, the Commission continues:

"[T]he term "enhanced service" shall refer to services, offered over common carrier transmission facilities, which employ computer processing applications that act on the

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[115] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p612, Federal Communications Law Journal, 56, May 2004, Number 3.
[116] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p613, Federal Communications Law Journal, 56, May 2004, Number 3.
[117] Deborah Eby, Editor, Understanding Computer III, p10, Phillips Publishing, Inc, 1986.
[118] Deborah Eby, Editor, Understanding Computer III, p10, Phillips Publishing, Inc, 1986,
[119] Deborah Eby, Editor, Understanding Computer III, p10, Phillips Publishing, Inc, 1986.
[120] Deborah Eby, Editor, Understanding Computer III, p11, Phillips Publishing, Inc, 1986.

format, content, code, protocol or similar aspects of the subscribers transmitted information; provide the subscriber additional, different or restructured information; or involve subscriber interaction with stored information. ”

“The Commission found the enhanced services market to be competitive and therefore not warranting a regulation.[121]”

Continuing with Whitt’s (2004) arguments, he further notes that an end result of the FCC’s decision not to regulate enhanced services was its effects on the Internet. Internet Service Providers (ISP) found that they were liable for the actions of those who used their networks to harm others. Although, Congress attempted to resolve this issue with the passage of the Millennium Copyright Act of (DMCA) of 1998, which allowed alleged infringers to take down contested material from their websites upon notification of a challenge by another after receiving a “notice and takedown” warning, this has not really been successful as ISP are being asked to assume the responsibility of their users. [122]

Essentially Whitt’s arguments are that there needs to be a concept of separating out what should be regulated against what should not be regulated. His reason for adopting a layers approach to policy making are that there are flaws in the current model that is used which the layers approach would correct. This is also the sentiments of Werbach (Whitt ,2004, p615), who is also of the opinion that communications policies will soon become a subset of the Internet Policy. Furthermore, Werbach (Whitt, 2004, p615) contend that the current silo method of regulating which is used, are not complimentary with the Internet. Werbach continues his argument by stating that the current model among other things has the following flaws:

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[121] Deborah Eby, Editor, Understanding Computer III, p12, Phillips Publishing, Inc, 1986.
[122] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p614, Federal Communications Law Journal, 56, May 2004, Number 3.

1. Any network in the Internet can carry any type of information while on the other hand the current model still continues to assume clear distinction among services.

2 Rules are given in “all or nothing” manner, while IP services are in more than one category.

3 Although the policy issue concerns relate to interconnection, the current laws looks at services in isolation.

4 End user services are the ones taken into consideration for policy formulation instead of looking at the network architecture itself.

As a contribution for a solution, Werbach (Whitt, 2004 p617), proposes a vertical approach that would correct the current flawed model that the FCC uses because it will .

- Show that Service boundaries are not tied to physical boundaries.
- Will within layers, separate even more the intra layer levels differences.
- Concentrate on networks and the operations of interconnecting layers within networks
- Concentrate on network architecture and regulate end to end networks and layered protocol stack.

Also, supporting Werbach is Sicker (Whitt, 2004, p615) who has found the following problems of distortion with the current method that the FCC uses to regulate:

1) Interconnection Distortion – ISP’s are not afforded carrier status and as such cannot connect with ILECs.

2) Networks and applications are seen as one causing problems with Universal services when these are not the same.

3) Bundling discrimination- There is access restriction to content.

4) Content discrimination – the medium of delivery and the substance of the delivery can be dictated by others.

5) Accessibility concerns – CLECS are not obligated to provide access for those with disability.

6) Security concern – CLECs are not affected by wiretapping restrictions.

7) Safety Concerns – Not all have to provide Emergency services.

8) Market distortion - Prices are not reflective of services.

9) Investment distortion. – Policies affect the investment decision of investors.

Frieden's (Whitt, 2004, p616) contribution to this argument is that technology is not fixed and static while the USA laws and policy used are based on an unchanging and set paradigms. This according to him encapsulates the arguments against the Vertical silo structures of the laws which prohibit and affect the convergence of telecommunications and the Internet.

In responding to Friden, it is my observation after studying the arguments that although this assertion may not be entirely without merit, this is not entirely the case. Over time, as new information and new technologies gets developed the FCC has tried to change it position to reflect changes in the business world. The drawback to this is that the FCC has in some cases been reluctant to adopt new changes in a manner that may be considered fast. The reason for this I would surmise is that the FCC attempts to first understand what is happening before making a decision. This period of inaction may be due to the public good aspect of its mission. It has tried to balance this challenge of pleasing both consumers (public) and the vendor (business). It may be that the period of delay like a gestation period allows the FCC to consider all the components of likely problems with its public hearings before suggesting any definitive rules.

The period of consideration is actually allowing the FCC to understand all the components of an issue before giving a prescribed solution. I will also offer that the FCC can in making rules, encounter the following situations:

i) Make hasty rules that turn out to be totally out of sync with the issue it is trying to provide a solution for.

ii) Make rules that have duplication in them are which are similar to other rules and therefore results in a confusion of which of the rules to use.

iii) Make rules that have duplication but which are inconsistent and results in the same problem as identified in ii as well as bring with them huge modification costs.

An example of this can be seen in the wire tapping rule for VoIP. Although the FCC had allowed the contents of VoIP calls to be produced when a subpoena is issued, a new law approved by the FCC in August 2005, allows Law Enforcement Agencies who want this capability access to devices that capture conversation content as it occurs. This is being challenged in court by privacy, technology groups and the American Council on Education. The main contentions are that such ruling constitutes a violation of human rights not to mention the huge cost of rewiring networks to meet this demand.
This ruling will affect VoIP providers as well as cable and broadband phone providers.[123]

Situations like this show 'not hesitancy' but rather a ' too thorough' analysis that the FCC utilizes in general in its decision making. Modification laws for example do not only carry wasted time and the expense of law suits due to their time consuming nature, are also costly to implement. Modifications to networks are not cheap also. Recently, the University of Wisconsin Madison did a regular network upgrade at costs of about $18

[123] MSNBC.com , Associated Press, Wiretap rule for Internet phones challenged, Privacy technology groups say FCC order would stifle innovation, Oct.25, 2005, http://www.msnbc.msn.com/id/9817428/.

million.[124] The other thing is that innovations cannot grow if a system is constantly bugged down in law suits. Consequently the slow to change policies perception that the FCC has now engendered might be due to the fact that the Commission tries to avoid making hasty decisions.

McTaggart (Whitt, 2004, p616) contends that to understand the legal issues of the Internet, the architecture must be understood and Entman (Whitt, 2004, p616) holds a similar view. His argument is that understanding the architecture provides a basis for seeing how the technical layers of the Internet provides a solution for regulatory problems. If the legal issues are understood, by understanding how the layers of the Internet operates, then logically Sicker (Whitt, 2004, p616) concludes that the layers in themselves will provide a outline for making policies. I agree with these views as understanding the components of a technology can give assistance in how its structure can be utilized in helping to provide regulations for its profitable continuation. In this regards, the structure of the technology becomes a valuable tool for effective policy formulation and implementation.

Layers Policy Making as a Tool

For Entman (Whitt, 2004, p616), the conceptual framework of layering gives a tool for policy formulation. According to him the following must occur:

- Application should be separated conceptually from content and transport.

As an input to this discourse, I note that this is now being done. The architecture of the TCP/IP model allows for this. As a result of this the "applications" layer in the TCP/IP

[124] MSNBC.com , Associated Press, Wiretap rule for Internet phones challenged, Privacy technology groups say FCC order would stifle innovation, Oct.25, 2005, http://www.msnbc.msn.com/id/9817428/.

layers model is essentially content matter which from a conceptual perspective is different from the transport layer. However as will be shown latter, even though the layers have different function they work together as an integrative whole to give a user service.   What develops from this is that some application which are considered as belonging to a particular layer will function in another. As an example of this, Wordiq in defining the presentation layer wrote “

“In many widely used applications and protocol, no distinction is made between the presentation and application layers. For example, HTTP, generally regarded as an application layer protocol has presentation layer aspects –”

What this does is that it allows applications that were developed using the OSI model to work in a TCP/IP environment seamlessly.

- Selective competition.   This should be contained at the higher application level while networks should not be made competitive.

 In this regard he is for allowing for competition among the actual endpoint services, but not among networks providing these services. The thing is that should this type of tool utilization become implanted as Entman is advocating a type of monopoly will again occur and this will negate the requirements of the 1996 Telecommunications Act. This is because what will happen is that fewer competitors will be in the market place and the options that consumers, the public and businesses may end up having will be choosing between what limited options are offered. In this regard, the argument can be offered that this will end up limiting innovation not promoting its growth. The USA cannot afford to be in this situation at this time.

- Selective competition within layers – Here policy makers can choose where within layers to allow for competition.

In this instance as well, the argument as given by Entman here seems to be supporting a type of concealed monopoly.

For Entman (Whitt, 2004, p618) then, the layered approach is a policy tool that allows for a shift in regulating services such as voice services as a content to regulating the transport of this content. For him it is a movement of having the different transport means getting regulated rather than using the traditional method of concentrating on common carrier voice networks. His contention is that it allows for the removal of barriers to innovation in technology given that the primary public policy goal of market economies is innovation. Without barriers, there is competition which in turn stimulates growth in markets and in innovation and hence the primary public policy goal is achieved. For him, the layered approach looks at each layers for areas of bottlenecks or limitation and eliminates this using the fact that differences in volumes may exist in different layers

As further input to this discourse, I notice that what has happened with these arguments of where to regulate to promote competition is that regulation is now seen as aiding market forces when before it was originally seen as blocking market forces. When regulation is seen as blocking market forces then there is usually a call for it to be deregulated so that market forces of competition will prevail. However, here it is seen as a stimulant to market forces. The argument is being given that by regulating a particular sector, this will stimulate another. The call is not just simply to deregulate to bring about market forces and competition but also to bring about innovation.

In this regard , it is being suggested that what regulation will do to competitive markets is that it removes monopoly hold so that there can be access, and at the same time by regulating, it adds restrictions so that access is limited in certain layers thereby correcting for too much competition. These recommenders contend that such actions bring about and satisfy the dual aspect of regulatory polices. The bottom line of this suggested regulatory method is seen by these authors as benefiting both the consumers as well as the market without the mention of deregulation. However, a close look at these arguments show as mentioned earlier, that they are suggesting a type of imperceptible monopoly shift. This underscores the problems of making regulations for the present telecommunications environment. It typifies the challenges of regulating the current Telecommunications Industry. What model should be used and how it should be implemented are not questions with easy answers nor are there easy solutions.

Cannon's (Whitt , 2004, p617) attempt at providing a solution on where to regulate looks at the boundaries between layers. For Cannon layering gives natural boundaries by allowing issues particular to a certain layer to be dealt in that area and this helps the different markets. An example he gives is that issues of the physical spectrum management are for example different from issues of content layer such as intellectual property. Sicker (Whitt, 2004, p 618) concurs with Cannon but suggests that the model that should be used should be a horizontal one which will be consistent with network designs. Regulations will concentrate on the role of layers by keeping regulations in layers distinct from each other. This form of regulation will take into consideration function of the roles of the layer above a particular layer and the layer below the selected layer in trying to form a policy. Using this format he argues however that regulation should be in the lower layers and should not be on the basis of network "type" but on the basis of Market power. This concept can be seen as a way of thinking and regulating horizontally rather than vertically. Frieden (Whitt, 2004, p617-618), thinks that this horizontally thinking, may involve overhauling the law. This is because some regulated services now may become less regulated while some new ones may become so. The bottom line is that the new laws would be based on the theories of technology and that this will eliminate need for current demarcation of communication for information services provisions versus services for users.

Whitt,[125] sees that a problem with these theories centers on mainly how the theories could be implemented. This involves putting words into actions. Specifically it involves issues such as how the theories should be made into policies, what the tests for monopoly should be, what the enforcement of the policies should be, how they should be implemented and how the laws should be changed to allow policy makers to make these changes. His concern with the layered approach is that this model may be used as an inflexible and rigid tool. Some like Nakahata (Whitt, 2004, 619) see it as too radical a change. While others like Sicker (Whitt, 2004, 619) regard the layered concept as an expansion of the current regulatory methods and that the layered model concept is not entirely new.

Notwithstanding all of this, according to Whitt, the then chairman of the FCC Michael Powell was of the opinion that there was a need for change in the regulation process as the laws pertaining to telecommunications regulations are disjointed and that as a result of this, there is the need to have an overhaul of the regulatory framework that starts from the beginning. [126] This involves a different way of thinking about things. He quotes Pepper of the FCC as noting that there is a different way of thinking that is involved in

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[125]Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p619, Federal Communications Law Journal, 56, May 2004, Number 3.
[126] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p620, Federal Communications Law Journal, 56, May 2004, Number 3.

policy formulation that pertains to voice for example as against that which pertains to the regulation of digital data networks and convincing politicians to move away from a traditional way of operating may not be very easy. [127] As an input here, I note that a reason for this is that politicians have interest in matters pertaining to their states. Given the nature of their roles as elected official, they have to be sure the structures of policy making that they are recommending will not only positively affect the nation in general but their state in particular.

Structure of the Policy Model Using Horizontal Layering

If horizontal layering is to be used for policy formulation the structure that this should take varies among different discussants:

Entman (Whitt, 2004, p621) suggest a four layer model

- Content – actual information
- Application- Nature of Service
- Network
- Data Link – routing information – physical

McTAggart (Whitt, 2004, p622) suggest four layers also:

- Content
- Application
- Logical
- Physical

Whitt's Model[128] will have the following layers:

- Content/Transaction Layer
- Application Layer
- Logical Network Layer

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[127] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p620, Federal Communications Law Journal, 56, May 2004, Number 3.

[128] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p624, Federal Communications Law Journal, 56, May 2004, Number 3.

- Physical Network Layer
- Transport
- Access

Sicker (Whitt, 2004, p621) suggests a model with 3 layers and an optional fourth layer

- Content
- Application
- Transport
- Access

For Sicker (Whitt, 2004, p624) the aim is to have a structure that logically divides the network and its services for easier analysis for public policy purposes. The purpose of the division is not to be concerned with the specific technology of the layers but with the policy opportunities.

As can be seen in the foregone discourse, there are real differences of opinion – With Frieden wanting the new laws to be based on the technology of the different layers, while Sicker is concerned with the market power within each layer since he is of the opinion that what should be used is design philosophy and not technical implementation. This reasoning however asks to the question: Which will be the most beneficial for the layers method to concentrate on technology or market power as its basis? Could it be not be that the technology can indeed dictate the market power? As the newer devises or intelligent components that will be discussed later show, the technology can dictate the services and user participation in the services can in turn dictate the market competitiveness and market size. As a result of this, logically, technology will be the determinant of market power.

Also, with regards to design and not technology being the impetus of the law, this may not be possible as with internet implementations, the technology is dictated also by the design philosophy. Design and Technology go hand in hand. As a result of this, by using one (for example design) is therefore by extension using the other (technology). I will look at these aspects later in the paper by looking at philosophy of design, technology and market power and how this relates to the VoIP and the broad band market. In the next chapter, I will continue the discussion and analysis of the policy models for regulations still using the framework of Whitt (2004) and specifically in this chapter I will analyze the discussion given of how they can be used in policy formulation.

CHAPTER 9

MODELS OF TELECOMMUNICATIONS REGULATIONS (PART 3)

Purpose of Layering

After discussing the possible structures of the layers model as a tool, before the layers can be used as a tool for making laws the reason for their being or how they can be used has to be articulated. Layering according to Whitt (2004), de-laminates and separates out the different layers in a manner so as to for example isolate application (content/services) from transport.[129] Entman/Sicker's (Whitt, 2004, p 623) contention are that layering separate out content and application and helps analyze and provide solutions for problems such as e-commerce issues and since the physical and logical layers are distinct engineering layers they should be treated as such. For Werbach (Whitt, 2004, 623), what this does is that it allows the separating out the network traffic layer and the logical layer from the application layer as a result of this it allows things to be seen more clearly using the inherent characteristic of the Internet.

McTaggart's (Whitt, 2004, p623) contribution in this area centers around giving definitions. Definitions act as a standard for general understanding. As a result of this he defines content as available Internet information. What essentially this definition does is that it looks at content not just as application or programs but rather at the amount of information that these applications are capable of conveying. It broadens the scope of what content is. He also provides a definition for transactions as links, form and type of end result that is expected from the dynamic sets of different interactions occurring. This combines the process, -the application, with the information it holds, the

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[129] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p620, Federal Communications Law Journal, 56, May 2004, Number 3.

content, and further narrows down to the level of what actually is in the information that is held. This policy format looks at the technology within the information scenario perspective. McTaggart gives an example of this as looking at how many subscribers can be served by a certain given amount of fiber lines. This analysis according to him, allows discourse into what the speed of the service should be and after being able to see what the different components involved are made up of, he contends that discussion can be made as to how best it should be managed.

Sicker (Whitt, 2004, p623) in using the layering method as a policy tool identified two different layers in policy decision making with regards to the Telecommunications – the access and the transport. - He believes that the network access – the last mile technology of the local telephone exchange should be separated from the transport network – the services provided by the inter-exchange carriers. Regulation will used to give an assurance that providers of telecommunications services will interconnect especially when a provider is a monopoly in several layers.

Whitt [130] for policy formulation recommendations on how the layers should be used concentrates on the architecture. As such he suggests a network Layers model that will have four layers. In describing his model, Whitt uses the work of Solum and Chung, and Lessig (Whitt, 2004, p624) and discusses that computers are the basis of the Internet and that the arrangement of this affect the architecture of the internet. His argument is that this architecture can in turn form the basis around which legal regulations can be structured and that regulators should not adopt any regulatory

[130] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p624, Federal Communications Law Journal, 56, May 2004, Number 3.

mechanism that go against the layers principle except there a very strong reason for doing so.

Specifically, he notes that regulations should not remove the separation between layers unless there is a compelling reason to do so, in which case, the regulatory process should target a particular layer for regulatory implementations in such a way that the effects of that targeting will be felt in the layer that required the regulation thereby minimizing across layers interactions.[131] In the first concept of not violating barriers between Layers Whitt utilizes Solum's Principle of Layers Separation while the second concept of minimizing distance is also Solum's Principle of Minimizing Layer Crossing.[132].   For Solum (Whitt, 2004, p626), these concepts form the basis of evaluating end to end architectures. In this model the architecture is seen of consisting of   stupid networks and smart applications   He also provides as other evidence of his model, two additional concepts which has labeled The Transparency Thesis and the Fit Thesis.[133] The transparency thesis argues that removing the layers lowers the innovative growth of the internet and damages the transparency of the Internet, while his Fit Thesis, argues that having a concept that allows the crossing of layers results in mismatch between the ends.

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[131] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p625, Federal Communications Law Journal, 56, May 2004, Number 3.
[132] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p625, Federal Communications Law Journal, 56, May 2004, Number 3.
[133] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p626, Federal Communications Law Journal, 56, May 2004, Number 3.

For Solom et al, the transparent internet as a neutral platform allow all to develop applications “with or on top of” TCP/IP with the horizontal layers allowing for communication while the vertical layers allow for transparency.   It can be deducted from Solum et al’s logic, that the vertical ‘divides’ of the layers model are what are giving the barriers as he has argued that a crossing of layers results in mismatches.

Solum et al (Whitt, 2004, p626), further explain that the vertical divides of the horizontal layers provide barriers that can be attributed to engineering factors or the inherent nature of the internet and that these are a built in divides which define which layer can talk to which layer. In sum, their suggestion is that in regulating the Internet, the regulations should use the lines of divide that the Internet structure has provided and that it is already a vertical divide. Their model will duplicate the application layer of the either the OSI or TCP/IP twice. In their model, the IP layer and the physical layers will be made the “common public” layers. The IP layer according to Solum et al (Whitt, 2004, p626) has a “stupid hop-by hop” design that allows the interconnecting of different network types into one network.

There is however as I see it, a limitation to this model as discussed. It assumes that all technologies (services) of the Internet will use incrementally the layers of the OSI and TCP/IP standard as they are structured.   In reality, this is not the case as some technologies completely bypass certain layers by enabling the capability of that layer within an upper or lower layer. In this instance then, the limitation of this type of policy formulation is that it will end up creating inconsistent policies as it will be making assumption and regulations of a layer albeit in a vertical format that a particular service does not use.

Solum et al(Whitt, 2004, p627) rationalizes that , problems that occur that pertain to the Internet can be rectified if it is viewed as a layers issue by identifying which layer should be the focus of regulation[134] Using this regulatory format, regulators according to Solum et al (Whitt, 2004, p628) , will be forced to use regulations that respect the layers models in decision making before making decisions that uses a format that violates the layers concepts. Decision makers will have to show that there was indeed a justifiable reason for not using the layers method.

Solum et al are of the opinion that using a layers method of regulation will minimize a case by case policy stance which has been identified by Whitt as "incrementalism". Incrementalism, according to Solum et al will not work because among other things regulators do not understand the Internet architecture and as a result of this, will provide policies that affect the inherent transparency built into the Internet. For them (Whitt, 2004, p628)) , the legal regulation should be tied to the architecture of the layers of the Internet, and the internet could be used as an "innovation commons" whereby decentralized innovation is placed in the hand of individuals who will keep the applications layer content competitive.

My perception of this concept of 'minimizing incrementalism' is that the policy as proposed will do exactly what it is the those suggesting it does not want it to do. This is due to the fact that although services are built up according to the standards models of the TCP/IP and OSI, what actually happens in addition to the fact that services bypass layers, is that also, usually different services that do the same thing may no even use

[134] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p627, Federal Communications Law Journal, 56, May 2004, Number 3.

the same layers. If this is the case then what will happen is that the regulatory environment will become one in which each service is evaluated as by a particular vendor or provider and regulated. The challenge to all these regulations suggestion is trying to find what is common and what will be beneficial for regulatory purposes.

Lessig (Whitt, 2004, p630), sees the "commons" factor as implying that no permission is needed for creating and installing new applications. This should not however be construed as such, as a caution, both Solum and Whitt reminds that the engineering principles of the layers should be used simply as a tool that evolves and grows as it possible that a concept that is better than the Internet may evolve. A similar view is also shared by Benkler (Whitt, 2004, p629) who sees a layers model as – one that allows the flow of information similar to that of "Shopping Malls" comparable to The Great Agora of ancient Greece . He cautions about using the layers model to replicate that of the mass media producer/consumer model as this may result in entry barriers being set up as well as a blending of products.

In all these discourse the one thing that I notice is that from all these models, is that the Internet is seen by the model formulators as a means of using regulation to "fit" some past concept such as the commons by Solum, the Great Shopping Mall getting transformed into the Great Angora – by Benkler. In all these illustrations the emphasis is not on for example making the commons conform to the Internet or making the Great angora conform to the Internet, but rather making the Internet conform and regressively change to theses 'market institutions " of the past. This is one of the problems of the layers model as it is being currently discussed. It is being seen and used as a tool that is superimposed on some other models to try to get a fit. It is actually being used as an overlay to something. An analogy that explains this can be taken from sewing. In this analogy, regulating telecommunication by way of the Internet can be seen as changing the style of some old outfit by cutting and changing it to fit modern style rather than thinking of it as a new outfit that is made out of new material but which will have a contemporary yet classic and timeless style.

The opposite side of the view just expressed is that the whole regulatory interest that centers around using the layers models as a regulatory mechanism for the Telecommunications Industry has with it a perception that in a market economy this is ‘the’ way that innovation will be preserved. Furthermore, in instances where the merging of the Internet is allowed to be perceived as ‘new’ without the forced overlay effects, regulatory factors that are inherent in it from its telecommunication background are made to be seen as ‘new’ when these were features that were already present in the telecommunications policy structures. This is the enigma and allure of the Internet. It can logically fit into any viewpoint. This allowance for openness in thinking and for diversity of thoughts as to its form is for example seen in the views of Lessig (Whitt, 2004, p630) who argues that creativity in the Internet can occur without permission, and yet, that for those who require control for creativity to take place, the Internet is the “simplest and direct response”.

My views on this is that it is in this type of thinking that harm can be done to telecommunications regulations through the use of factors of the Internet. Currently, the prevailing viewpoint is that it [the Internet] and by extension telecommunications is ‘infinitely’ flexible and expandable and that it can and does fit everything. The challenge for lawmakers then is to try to find a “model” as it were, that though based on these features of the Internet will be all encompassing for the governance and regulations of the Telecommunications Industry by taking into consideration the flexibility of the Internet but allowing both the Internet and the Telecommunications Industry to maintain their unique identities.

Can an amorphous entity such as the Internet be made to conform to a set mould all the time so that telecommunications regulations can benefit from it? If the answer is given as yes, then the entity that is being described is not the Internet. The reason for this is that if it,[the Internet] subscribes to a fixed format, it will not be able to make the "Fit" that it is currently making for every thing and anything. In other words it [the Internet] will loose its amorphous nature. The premise has been established however that it does indeed conform and fit everything. The conclusion that can be taken from this is that it is "mystical". However, even this will not address its structure as mysticism conjures images of unreality, while the actions of the Internet are seen in physical tangible reality. This then further confirms that the challenges of policy regulation and implementation are not an easy one. How can the tenets of internet be utilized in the policy making for the Telecommunications Industry so as to allow both to maintain their individuality and flexibility? A way to start may be by looking at the structure of the Internet.

Structure of the Internet

Hour Glass

This challenge of the almost "impossibility of pigeon holing" the structure of the internet has not deterred several scholars however from trying. Katz (Whitt, 2004, p630), has identified an 'hourglass' structure of the Internet. My disagreement with this structure is that giving the Internet an hourglass structure may not be an accurate representation of its form. This is because although the Internet does indeed make use of time, and although its existence is based on the synchronization and timing of devices, it is not affected by time. This is because an hourglass structure implies a bottleneck point of restricted movement. This does not happen in the Internet. This will be made more apparent if the entity 'Internet' is compared to another such as the Airline Industry. The airline industry can be defined by an hourglass structure for example. This is because there is a bottle neck or time difference between a plane taking off from one city and the time in which it arrives in another. The Internet however does not suffer from this malaise. The packet structure of the underlying technologies that guide it so far have eliminated the concept of bottleneck that may be seen as a time limitation.

Plasticity

MCknight (Whitt, 2004, p629) views the internet as having a contained structure that allows for open communications as well as innovative growth. Furthermore, Lessig (Whitt, 2004, p630) links this open structure which can foster growth that the Internet has, to its technology and compares the Internet to an unpredictable yet plastic entity. In this regard, I again find that I have a disagreement with this description of the structure of the Internet that these scholars have espoused. The technology of the internet is actually more than plastic or flexible. Plasticity involves an elastic view of a concept which expands and returns to its original form. In this regards, elasticity and flexibility are subsets of plasticity.

I find I do not agree with these view as the underlying frame supposes the reaching of a breaking point or at least getting to a point of stagnation. I base this on the premise that the internet does grow and change and expand and that both its underlying structure and the current efforts of the groups that administer it allow for its expansion by not limiting its growth in any area. It is allowed to inherently change while still maintaining the original goal for which it was developed which is to get different factions to communicate. Having said this, I make a disclaimer. In order to maintain its amorphous nature, at the Internet's beginning, rules were instituted as to how it should be further used. These original rules at the beginning however were made in a way as the laws were seen at the time. The rules of the engineering that drives the Internet were made in consideration of the laws of the legal system. The rules of formation were made so as to allow the Internet to be synchronous with the legal environment. In this regard then the argument can be made that the layers of the Internet at the time of its creation, replicated and internalized what ever barriers western laws had and given the manner in which protocols are currently approved, this is still be said to be the same. Another way of saying this is that the Internet is synchronized to the law. Its engineering takes the law into consideration in the way the layers are set up. The challenge that this brings with it has implications for the global Telecommunications Industry as this is seen by some as being encompassed by the Internet sector. Rules and policy formulators have to find the fine balance between both so that efficient and effective regulations of both are maintained.

Competition

The role of the actual layers as a moving force for competition as well as the way it will be used in the layers model to bring about innovation has been discussed. However, there has been concern by some such as McTaggart (Whitt, 2004, p632) who wonders if the current anti competitive laws will be enough protection for consumers in the Internet. In the USA, antitrust laws provide this protection. According to Frieden (Whitt, 2004, p634) , The European Union has also adopted a horizontal layers model concept. In the EU's model, telecommunications, median and information technologies are all regulated by single regulatory framework. The EU has defined their framework by giving definition to electronic communication network, electronic communication service and information society services. The information society services sector is made a subset of information services and the conduit component of the telecommunication network is regarded as a subordinate to the content applications of the information services. The EU's method concentrates on the hierarchy of identifiable layers in information and telecommunications provisioning. Furthermore Frieden(2004) notes that the EU has defined an Internet-Mediated Information, Communications and Entertainment(ICE)[135] model , where industries are classified into separate categories based on product life cycle[136]. An ICE regulatory model is used in which ICE industries are regulated by the EU when a business venture has significant market power which national and community anticompetitive laws cannot address. [137] Although the EU's model has separated content from conduit layers, either of these layers can be regulated if there is an existence of market distortion. [138] The policy model that is used in this instance is that which relates to general antitrust policies and is not a service specific regulation.[139] Sicker (Whitt, 2004, p634) supports this model of regulating as he is of the opinion that as it will determine how to treat providers of different services at different levels.

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[135] Rob Frieden, Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach, p217, Federal Communications Law Journal, 55, 209, 2003.
[136] Rob Frieden, Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach, p218, Federal Communications Law Journal, 55, 209, 2003.
[137] Rob Frieden, Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach, p247, Federal Communications Law Journal, 55, 209,2003.
[138] Rob Frieden, Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach, p248, Federal Communications Law Journal, 55, 209,2003.
[139] Rob Frieden, Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach, p207, Federal Communications Law Journal, 55, 209,2003.

Katz (Whitt, 2004, p634-635) contribution to how the treatment of different levels should be handled is seen in his suggestion that the de-lamination of the layers in horizontal model especially in the application and transport layers will determine how to treat conditions such as merger policies as well as issues pertaining to price and other interconnections issues - Furthermore Katz see market power getting caused when the nature of the sunk investment prevent others from being able to enter and provide a service. The ensuing structures that get created as a result of this condition which Katz (Whitt, 2004, p635) has labeled as “bottlenecks or choke points could then be evaluated singly to identify the point where there is significant market power accumulation. At the application layer the focus of the regulatory emphasis of market power will center around intellectual property rights and those investment services that have large sunk development costs. Wiser (Whitt, 2004, p635) cautions that these bottle neck structures or exclusive control points can be occur in any layer and not just at the physical layer where they are seen as ‘exclusive gatekeepers”.

To prevent the problems of accumulated market power, Mcknight (Whitt, 2004, p635) offers a solution for a new regulatory policy structure. This structure should be created in such a manner that it will allow for open, universal and flexible access as well as have an open architecture. A way of achieving this according to Weisman (Whitt, 2004, 636) is with strong antitrust policies across the different layers. Whitt concurs with this as he sees unregulated market power as counter competitive and counter innovative.[140] He notes that:

“Policymakers must use the network layers concept to develop a more sophisticated understanding of the deleterious effects of unconstrained market power, and take action

[140] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p636, Federal Communications Law Journal, 56, May 2004, Number 3.

if necessary to preserve the “innovations commons” of the Internet and other data-centric networks.”[141]

To be able to use the Internet structures for effective telecommunications policy making, this chapter looked at how the component structure of the Internet can be used. Although several authors were discussed who postulated how this should occur, the analysis found several limitations with the proposed models. The discussion of market power at its basic form implies value. At this point in time, the argument can be made of the Internet as the newest sub sector of telecoms that it has an intrinsic ‘[142]embedded value’. There is no denying the intrinsic value that the Internet posses as an entity that generates knowledge which is in turn used to generate new knowledge. In this manner it acts as both a purveyor and user of information. Bozeman and Rogers(2002, p773-774) note that “Information without use is information without value. “ They continue that “once put into use, information becomes knowledge and perforce has value” and that “ knowledge (information-transformed-in-use) give rise to new information” which is seen in new developments. In the Telecommunications Industry as is currently energized by the Internet, this characterization of new innovation giving rise to newer ones typifies the norm in the Internet and puts it in the unique position of being productive in that it has measurable outcomes of monetary value but also gives it an ‘importance’ and uniqueness in that it has a worth that also cannot be priced. Extrapolating from the “Knowledge Value Collective’” theory of Bozeman and Rogers(2002, p774), the argument can be made that this value of the telecommunications innovations as provided by the Internet cannot be priced but that at the same time, it :

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[141] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p636, Federal Communications Law Journal, 56, May 2004, Number 3.
[142] Barry Bozeman, Juan D. Rogers, A Churn Model of Scientific Knowledge Value: Internet Researchers as a Knowledge Value Collective, p 773-774, Research Policy, 31,2002.

"..creates and enhances scientific and technical human capital, the sum of the user's knowledge and social ties pertaining to the use knowledge"

However, although Bozeman et al's (2002, p779) 'Knowledge Value Collectives' (KVC) on which their theory is built are unstable and change over time, the same cannot be said to be true for the Internet. Instability implies a change factor that carries with it an element of detriment. All indications are currently that this is not the case with the Internet and its technologies. Were this the case, billions would not be spent on implementing new infrastructure to promote its growth, neither would governments globally invest unprecedented amounts of human as well as monetary capital in ensuring its continuation within proper regulatory frameworks. These point to the fact that there is more to the Internet and its changes and variations other than embedded or monetary values that prevents it from become an 'unsound and insecure' entity and this line of reasoning is continued in the final chapter of looking at Whitt's paper.

CHAPTER 10

MODELS OF TELECOMMUNICATIONS REGULATIONS (PART 4)

Policy Making Using Internet Structures

This chapter continues by looking at regulations from the perspectives of using present Internet Structures. The discussion in the last chapter on models looked at the proposed Horizontal method of structuring polices for the Telecommunications given the rapid convergence that is taking place. The way the laws are represented currently as argued by some to be a Silo method has been shown to be in actuality comprising of both a silo and a horizontal type of methodology. Models have been presented and the merits and limitations of these have also been discussed. The argument has also been given that the layers method of regulating is similar to that of the way the western laws are presented. The analysis continues by looking at possible violations that may occur with the use of the horizontal layers model in telecommunications rule formulations. Also, the discussion that started in the last chapter that considered the effects of looking at only specific layers regulation will also be discussed to some depth in this chapter.

Policy Making using the Internet

Whitt (2004) sees regulation primarily in 2 forms a) regulation by FCC and state PUCs he gives an example of this as FCC regulating VoIP and 2) International bodies , Congress and other international types of regulations and he gives an example of this as the European Commission's ruling on spam policies[143]. For him, regulating the Internet and by extension the Telecommunications Industry boils down to having the physical

[143] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p636, Federal Communications Law Journal, 56, May 2004, Number 3.

and network layers being regulated using traditional regulatory methods, “while Internet content-related regulations should focus on higher (application and content) layers. He writes:

“Generally speaking, traditional communications regulation should focus on the lower (physical layers and network) layers while, Internet content-related regulations should focus on higher(applications and content) layers”[144].

At this point, it would seem as though Whitt is advocating two forms of telecommunications regulations. At the start of his analysis, he had advocated not regulating the higher layers of the horizontal model he had prescribed, while here, he is advocating two forms of regulations. One that relates to the lower physical layers and which deals with the medium and one for the application content related layers. However, he clarifies his position by continuing:

“...policymakers must be persuaded to impose legal and/or regulatory obligations on the lower layers of the last-mile facilities leading to and from the Internet, where necessary and not on the actual services or applications themselves.” [145]

In reviewing Whitt’s argument up to this point, I note that despite his clarification of his prescription of how the Telecommunications Industry should be regulated that he has inconsistencies in how regulations should occur. First there are his argument that there should be a regulatory model that addresses market powers by concentrating on the different layers to see where market power is accumulated and addressing this with regulation. Then he suggests that only the lower layers should be regulated and not the upper ones. What this is implying is that market powers in the lower layers should be

[144] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p636, Federal Communications Law Journal, 56, May 2004, Number 3.
[145] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p637, Federal Communications Law Journal, 56, May 2004, Number 3.

regulated, while market power in the upper layers should not be regulated. If this type of policy is implemented, then it is going to produce an incomplete form of regulation. This is because the regulation would be concentrating on layers that do not have a problem to correct problems in layers in which there is a problem. Whitt however tries to clarify his model by enlisting the work of Solum and Chung[146] who have identified two major types of violations of the Layers Concept

Violations in the Layers Principle

According to Whitt the following types of violations may occur: a) violations that that occur at the TCP/IP Layers; b) General "Communications systems layers violations"

In layers violations he has noted that this problem occur when a regulation is made at a lower protocol layer to correct problems in an upper layers. He believes that when a regulation clearly and "narrowly' focuses on a particular layer the less problems it will cause on other layers and or affect the transparency of the layers model.

1. <u>Physical Layers Regulation for Content Layer Problem</u>

Whitt gives as examples instances in which physical layer access to the Internet is restricted and government monitored such as in the case of Myanmar and Tunisia as well as in the USA preventing web access to Yugoslavia[147] These examples bring up some of the critical and core issues that C21 Internet usage has to address not only

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[146] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p636-637, Federal Communications Law Journal, 56, May 2004, Number 3.

[147] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p638-639, Federal Communications Law Journal, 56, May 2004, Number 3

nationally but also globally. In this regards, then I wish to offer the following arguments for consideration.

Can the lower layers of the Internet be separated from the content? Can a country cut all forms of diplomatic ties with another and prevent information from sites on one side of the dispute from reaching the other via the Internet? Is it the right of a sovereign nation to protect the information contents its citizens see. Is the "Internet world", like the Vatican City, with rights similar to a sovereign nation? If it is, who and what gave it those rights? Whitt noted after the USA cut ISP access to Yugoslavia the following:[148]

"On may 13 [1999] , in what some have characterized a "flagrant violation of commercial contracts with Yugoslav ISPs, as well as an attack on freedom of the Internet," the U. S. government ordered the Loral Orion company to shut down its satellite feeds for Internet customers in Yugoslavia."

Since the Internet is an Information service, as I will show later, in the USA, the Internet has the protection of the freedom as given by the Constitution of the USA. However, in Countries that do not have this stated freedom, where does the Internet stand? Does the Internet enjoy a ubiquitous world wide freedom? If so, is this a chartered freedom that nations have ratified and agreed to as to other chartered agreements? Was the USA justified in preventing access to Yugoslavia? If not why was this the case? Also if were, on what grounds? These are not easy questions, however they have to be faced and answered. The Internet is causing nations to re-think their respective national laws and make amendments by way of new Telecommunications Acts. These Legal Acts are taking into consideration the effects of legislations not only from a national perspective but from an international one as well. This happened in the USA. The

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[148] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p639, Federal Communications Law Journal, 56, May 2004, Number 3.

reality of the situation however, is that the new services that the internet is generating are not only limited to telephony which is the traditional telecommunications service. There are now new features and services such as E-commerce, taxes, on-line ownership rights and issues such as privacy that the current laws never had to contend with before and this gives the perception that the structure of the current fit of the law is not equipped to handle the newer aspects of telecommunications. What this has highlighted are questions of the form the future FCC should for example have to handle if at all, this limitation. This raises questions such as is it the FCC that the USA wants to equip with authority to handle these new scenario? If so how? The current structure of the FCC is adequate now for what it has to do. However, it may be the case that as Internet continue to grow its ensuing problems may also increase and this may cause the structure is currently has to be inadequate.

2. <u>IP Layer Regulation for Content Layer Problem</u>

Whitt's example of this is that of the French government affecting the free speech of another country by requesting the shut down of the yahoo.com site in France which it considered had offending Nazi memorabilia and fining yahoo. This ruling was later overturned by the US Federal court. [149] He has also, cited the Pennsylvania courts blocking subscribers of MCI's access to pornographic sites. He has suggested a solution of having digital certificates with encoding at the applications layers to prevent what he seen as a layers violating regulation[150].

[149] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p640, Federal Communications Law Journal, 56, May 2004, Number 3.

[150] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p640, Federal Communications Law Journal, 56, May 2004, Number 3.

As my input to this discuss in this area, I will concentrate my argument on the ruling of the Pennsylvania Court blocking. This ruling brings up the fact that this is an issue that goes far beyond that of a layers violation issue. It is more of fundamental social issue problem that asks the question: Does pornography have a right to exist in modern C21 society at all? Once that question is answered then it asks the other should it exist on the Internet or is it not to be allowed to exist in this sphere? If the answer to the first question is to the affirmative, then there should be laws explicitly identifying pornography's existence. As a result of this, it is not simply a layers or content issue, it is more specifically an issue of what current and future societies will or will not tolerate. Once this has been agreed upon, then where it can or cannot exist will be more apparent.

In general, the violations that Whitt has cited are valid but as the discussions show, these are issues that are inherent in the Internet and in the light of the bigger picture of the Internet acting as a convergence catalyst, they become issues of the Telecommunications Industry. These are new issues which are emerging from the Internet as it seeks to define its identity with the broader telecommunications domain. In this regards then, as noted earlier, this is something that that has to be studied as to how best the Laws and the FCC's authority will be will be modified to handle them.

3. Transport Layer Regulation for Application Layer Problems.

As an example of this violation, Whitt[151] cites, the ISP RoadRunner blocking the use of peer to peer software and the Panama Government blocking 24 User Datagram Protocol ports (UDP) to prevent VoIP access.

4. IP Layer Regulation for Transport or Application Layer Problems

As examples of this, Whitt [152] cites the Chinese government blocking access to internet cafes, as well as the allegations that cable companies have control of 70 percent of the broadband market and have prevented their ISP from selling services such as streaming video. According to Whitt, these restrictions have resulted in price increases and market failure. With regards to the cable industry in the USA, although Whitt has stated these allegations about the Cable companies, he did not however, provide evidence to show that it has been done. What he has done is to conclude as follows regarding the Cable companies:

"…Whether or not these practices have in fact taken place, these alleged use restrictions constitute clear examples of potential IP layer regulation."[153]

Furthermore Whitt [154]wonders if Verisign Site Finder service in which incorrect web and email addresses were sent to a pay per click web site that is owned by Verisign is an

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[151] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p641, Federal Communications Law Journal, 56, May 2004, Number 3.
[152] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p642, Federal Communications Law Journal, 56, May 2004, Number 3.
[153] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p643, Federal Communications Law Journal, 56, May 2004, Number 3.
[154] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p645, Federal Communications Law Journal, 56, May 2004, Number 3.

innovation or a deceptive practice. ICANN has asked Verisign to stop this service, because there were concern about it among which was that by redirecting URLs it violated the authenticity of the Internet Domain Name system.

Communication Systems Problems

In discussing regulations that affect communications systems, Whitt[155] , identifies regulations such as the copy protection clause of the Digital Millennium Copyright Act (DMCA) which prevents the bypass of copy protection technologies as justifiable layers crossing in which a lower layer is regulated to protect an upper content layer service because according to him, ", the communications system layers do not share the general transparency requirement or expectation across the layer" and also because he a argues that "… the code is not part of the network system"[156]

Two things stand out with Whitt's discussion here. The first is that this argument is contrary to his claim that communications is moving towards the Internet and that these should follow the layers model or regulation. His discussion in this instance may suggest that Whitt is of the opinion that there should be different forms of yardstick for the different regulatory matters that must be handled. The second is that although he is arguing here that it is a 'code' that is violated and that this is not part of the network, the code in this instance can be seen as, and is in fact an application and a content layer component and is as such part of the total networking concept**.** In this instance, the code allows information to become transported across the network.

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[155] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p646, Federal Communications Law Journal, 56, May 2004, Number 3.

[156] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p646, Federal Communications Law Journal, 56, May 2004, Number 3.

Whitt has cautioned against using the Layers model as a type of "Layers police"[157], but rather recommends that the model should be used to avoid government intervention in a wrong layer of the network model. He has also cautioned that vertical silo models are not to be disregarded but rather should be used evaluated for monopoly concerns. He concurs with Solum that regulating a lower layer of the network model to correct problems in a higher layer causes serious violations problems and that the reverse of having a monopoly situation in a lower layers causes disruptions in the upper layers and harms market competition.[158] He explains these concepts by using two other principles of Solum's the third principle is the Principle of Leveraging Lower Layers Control while the fourth principle is the Principles of Focusing Regulatory Attention.

In explaining The Principle of Leveraging Lower Layers Control, he surmises by saying that innovation in the upper layers is predicated on access to the lower layers and that a monopoly position in the lower layers causes disproportionate market power in the upper layers. He however is unable to provide any recommendations on how market power should be tested or remedied. He continues that [159], The Principle of Leveraging Lower Levels control can be used to deal with controlling primarily the market power of providers in a specific list which he has given as Incumbent Local Exchange Carriers (ILECs), cable companies, and purveyors of radio frequency services such as wireless

[157] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p646, Federal Communications Law Journal, 56, May 2004, Number 3.
[158] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p647, Federal Communications Law Journal, 56, May 2004, Number 3.
[159] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p648, Federal Communications Law Journal, 56, May 2004, Number 3.

service providers, broadcast and TV networks and Station operators. He sees these as currently having “non-market based advantages”.[160] As an input to the discussion at this level, I tend to disagree with Whitt’s observation on this matter. This is because the current deregulation legislations such as the unbundling ones are made with the main purpose of eliminating monopoly in any layer and making available a competitive environment regulatory environment for this to occur in while taking into consideration expenditures of putting down infrastructure and other costs and those in the list he has isolated have made and do continue to make huge infrastructure investments. To regulate only those in the list he has identified will be separating the technology from the total regulatory equation and this may end up providing an inconsistent regulatory formula. With the intense competition as it exists currently and as is made possible by the rapid rate of technology innovations the argument can be made that there are no non market based advantages.

According to Whitt[161], in the USA regulators have a responsibility to ensure that there is competition between different physical platforms (intermodal regulation) as well as to within layers that have market power concentration (intramodel regulation). He believes that unbundled network elements (UNEs) can help promote competition within layers and notes that that using a horizontal framework to analyze recent FCC rulings created misgiving about the rules adopted. He gives as an example, the ruling that the FCC made by distinguishing between narrow band circuit switched environment and a

[160] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p649, Federal Communications Law Journal, 56, May 2004, Number 3.
[161] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p649, Federal Communications Law Journal, 56, May 2004, Number 3.

broadband packet switching capability in order to identify what UNEs should be provided to Competitive Local Exchange Carriers (CLECs). In making this ruling, the FCC used a regulatory differentiation between fiber based local loops and copper based local loops. Whitt[162] questions this ruling as it suggests that the medium is the most important factor that the FCC used to make a decision rather than the market power involved.

In discussing the Principle of Focusing Regulatory attention[163], Whitt reaffirms his belief that the layers that should be regulated are those that have market power. He supports the opinion of Digadj, 2002[164] that only bottleneck areas should be regulated as well as that of Lawrence,2004[165] that networks and not services should be regulated.

Furthermore[166] he is against the FCC using the Basic/Enhanced dichotomy because according to him, the basic/enhanced dichotomy is old and has been unchanged for several decades and does not fit with the new network and code pattern. Another problem that he has with this basic/enhanced topology was that it was it was created for telephony networks and has not been used as a regulatory framework for other types of communications networks. He is of the opinion that a horizontal regulatory model can

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[162] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p650, Federal Communications Law Journal, 56, May 2004, Number 3.
[163] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p650, Federal Communications Law Journal, 56, May 2004, Number 3.
[164] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p651, Federal Communications Law Journal, 56, May 2004, Number 3.
[165] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p651, Federal Communications Law Journal, 56, May 2004, Number 3.
[166] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p652, Federal Communications Law Journal, 56, May 2004, Number 3.

be extended to all types of two way networks regardless of topology and in this regards he believes that it can apply to “copper, fiber, coaxial, cable, radio signals and power lines”. [167]

Another argument that Whitt brings up is that Incumbent Local Exchange Carriers are requesting that they should be free from regulations for their data services – also known as their information services as they are in a competitive market. He supports the views of Werbach[168], that this is not so. His claim is that this market should only be deregulated when the ILECs are not able to use the control they have in lower layers to affect higher layers.

Vertical Integration Concerns

In his discussion of broadband access platforms[169], Whitt has concerns which are shared by Werbach, over closed broadband networks which deny access to independent ISP as they are of the opinion this violates the end-to-end principle. Werbach would like to see specifically the interfaces between layers open as well and he argues that it allows for competition as a layer in which there is a bottle neck problem is bypassed and another layer used for a particular service development and deployment. He sees the discussion over cable infrastructure as one in which cable can be used at the lower layer to control the upper layers in the TCP/IP Model. For Clark and Blumenthal (Whitt, 2004,

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[167] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p653, Federal Communications Law Journal, 56, May 2004, Number 3.

[168] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p653, Federal Communications Law Journal, 56, May 2004, Number 3.

[169] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p653, Federal Communications Law Journal, 56, May 2004, Number 3.

p654), the issues is not only about ISP choice but also about loss of openness in the Internet. While for Bar and Sandvig (Whitt, 2004, p654) the issue is about fairness and creativity.

In a rare move, Whitt[170] supports the FCC's manner of treating Digital Subscriber line DSL transmission services (copper over telephone line) as a telecommunications services that is regulated while at the same time, treating the Internet access part of that service as unregulated information services. The internet access services of cable providers utilizes channels that would otherwise be unused during TV broadcasting. In wireline broadband, copper is used over telephone lines to increase the speed of the network and although cable and Internet services had been regulated differently, FCC has agreed to treat both the DSL and the Internet aspects of it as unregulated Digital Subscriber line service. With DSL services treated as an information or data service and not as two distinct services with one having a telecommunications component, Whit [171] is of the opinion that this precludes ISPs access to DSL inputs as was the case under the computer Inquiry and that the new ruling would violate the layers principle making all the layers information services defined by upper layers. In so doing he contends that the physical access layer would control or discriminate against the other layers. He believes that the FCC should abandon the blending of application layer services such as Internet access and lower level physical access layer services such as broadband access. Under proposed new rule – if a telecommunications provider serves telecoms

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[170] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p654, Federal Communications Law Journal, 56, May 2004, Number 3.
[171] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p654, Federal Communications Law Journal, 56, May 2004, Number 3.

and information services together they are not regulated as a common carrier but rather as an information services provider. [172]

Frieden (Whitt, 2004, p655) is also against this move for a number of reasons. He believes that there is not a clear distinction as to what constitutes telecommunications services. I agree with Frieden on this issue. In this regards his assertion can be taken as a valid argument and later on, I will show from a technical perspective that this definition of what constitutes a particular service from another is currently not as easy as it seems because the two technologies are similar and dependent on each other . Under the new rule, Frieden is concerned that when a telecommunications provider offers both telecoms and information services together and is therefore no longer regulated as a common carrier but rather as an information services provider that this will in fact be a rejection of the traditional legal, business and technological differences between the two types of carriers.

As an input to this discourse, I note that this is the outcome of convergence. Although there are several different physical medium or physical infrastructures that allow the transmission of data, the qualities of the new digital technology are such that innovations and new technologies make it possible for both telecommunications and information services to be similar. Increasingly it is becoming impossible to find a telecommunications service that is not 'enhanced' in some manner once the physical infrastructure which is extremely costly has been laid out. The pertinent thing therefore is not to see the new trend as a rejection of tradition but rather as growth and expansion

[172] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p655, Federal Communications Law Journal, 56, May 2004, Number 3.

of the Telecommunications Industry. In order to be competitive globally, the Telecommunications Industry in the USA, has to find new ways of defining legal, business and technological interconnectedness and structures that highlight the reality of the expanding field

Sicker's (Whitt, 2004, p657) input into this discourse centers around his opinion that competition in the higher layers will be eliminated because broad band has to be implemented and he sees this as a form of vertical integration.[173] My opinion is that this may not be the case. This is because in this regard, there is not going to be a curtailment or minimization in the growth of this market because of the deregulatory ruling. On the contrary, with the proper incentives to implement and invest in the deployment of fiber optics this will allow the telecommunications service providers to invest, implement and develop more physical layer infrastructures and this will allow the telecommunications field to progress at an even faster pace. Broadband deployment is needed as the current speed of DSL lines may not be adequate to for the services that use the Internet. Therefore, rather than become an hindrance for the upper layers it will allow for extensive growth An example of this will be mentioned here and discussed later. Currently, DS1 (T-1)[174] circuits have the capacity of 1.5 Mbps, however, there is technology already developed that has the capacity of 8,064Mbs (9.6 Gbps) in OC192 fiber lines.[175]

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[173] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p657, Federal Communications Law Journal, 56, May 2004, Number 3.
[174] Devshed.com, DS3-T-3 , What is a T-3 Line? DS3 Technology , http://www.devshed.com/ds3.
[175] Stephan D. Cote, Fiber capacities, http://www.bralyn.net/etext/reference/computer/fibercap.html.

Although the use of such speed is currently very expensive, with the proper developments in the higher applications layers, the price of deploying systems using this capacity will decrease. In just the consumer home market alone, with discussions of wired houses of the future and all that entails, there is going to be even more growth in the applications area to handle all the different information systems that will of necessity become available. When this is compounded with the different fields of study and businesses for example and expected application growths in these, there is no denying that there is going to be extensive and substantial innovation in the C21 even more so than the C20 saw. In this regard, there is practically no limitation on what can be achieved. Innovation will be limited by the imagination in this instance. Given that this is the case, to try to force fit this new possibilities into that of fixed intractable traditional regulation will not work. With such promises of future growth, there is no way that the ILECs or even Cable providers can curtail growth or competition.

Sicker and Vint Cerf (Whitt, 2004, p653) they are concerned that the ILECs require incentives to implement DSL based Broad band facilities because according to Vint Cerf these facilities are already available. Whitt[176] also concurs with them and disagrees with the ILECs claim that DSL implementation is a revolutionary one and not an evolutionary one. In this regards, I agree with the ILECs. Although currently available technology for DSL is copper run over existing twisted pair telephone lines, the capacity of these lines may not be sufficient for the future. To be able handle the broadband needs of the future, these lines with their line speeds of 1.54 Mbps for DS1 lines and speeds of 0.06 MPS for DS0 lines cannot really provide the structural infrastructure that

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176 Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p657, Federal Communications Law Journal, 56, May 2004, Number 3.

is going to be needed for telecommunications, voice and Internet needs in the future when it is taken into consideration that one fiber optics pair can provide 9.6Gps capacity. As can be seen from these numbers the increase in line speed is not really an incremental one as is suggested by Vint Cerf (Whitt, 2004, p658). In reality, this is about an 8000% increase in line speed capability that will be made possible and in fact could also be improved upon. Further, investing in the deployment of fiber optics cabling is very expensive. As a result of this, the reality of the situation is that ILECS and cable modem providers do need an incentive to deploy broadband facilities and the need is a real one. At the same time, those cable establishments which with visionary foresights have already invested in such fiber optics implementations for cable modem services should be allowed for economic reasons to recoup their investments.

In 2002, the FCC realized the importance of having an infrastructure that will provide for future development by allowing cable companies that provide cable modem services from opening their networks and had ruled that this service was an information service and not a telecommunication service, thereby free cable providers from regulations that other telecommunications services face of opening up their networks. [177] This ruling was made invalid by the United States Court of Appeals for the Ninth Circuit.[178] The case went before the Supreme Courts of the USA where both the cable companies and the ILECs are supporting the same side of the issue- that broadband services should be

[177]Linda Greenhouse, Supreme Court to Hear Case on Cable as an Internet Carrier, The New York Times, Published: December 4, 2004, http://www.nytimes.com/2004/12/04/business/04scotus.html.
[178] Linda Greenhouse, Supreme Court to Hear Case on Cable as an Internet Carrier, The New York Times, Published: December 4, 2004, http://www.nytimes.com/2004/12/04/business/04scotus.html.

treated as information services which are not subject to regulations[179]. The fact that two major sets of competitors are on the same side of the issue is a strong indication that this issue should be regarded from a different perspective. In June 2005, the Supreme Court of the USA, supported the claims of the cable companies and ruled that they did not have to share their lines with smaller ISPs.[180]

Whitt's primary concern is that other application layers developments rely on the physical layer and that an omission to regulate the physical layer will result in infrastructure providers monopolizing the higher layers due to vertical integration which could harm the Internet.[181] Solum et al (Whitt, 2004, p659), shares these concerns as they see especially in the cable market vertical integration occurring with the cable companies owning all the layers. These concerns are valid but are just that concerns. This is because consumer and customer demands in the applications (content) market will continue to increase for more functionalities and services. To meet this, the applications market will in turn remain competitive as needs of the Internet are now globally not nationally driven. This fear of a new medium especially with regards to cable is not new. There were fears of monopoly and restrictive growth concern that prevailed in 1984 when the Cable Act of 1984 was passed which deregulated the cable market. Congress in allowing for the deregulation hoped for an industry that will benefit

[179] Linda Greenhouse, Supreme Court to Hear Case on Cable as an Internet Carrier. The New York Times, Published: December 4, 2004, http://www.nytimes.com/2004/12/04/business/04scotus.html.
[180] David M. Walt, Supreme Court Rules in Favor of Cable Cos, Forbes.com, 06.27.05, http://www.forbes.com/2005/06/27/cable-supreme-court-isp-cx_de_0627cable_print.html.
[181] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p658, Federal Communications Law Journal, 56, May 2004, Number 3.

both consumers and business alike. This came true as cable revenues grew from $600 million in 1984, to $31.51 billion.[182]

Also Whitt[183] cites as an example Qwest's ability to untangle DSL services and offer a "naked DSL", as a valid evidence that the DSL services can be fragmented, the issue really now is not on how best a DS1 1.5 Mps line or at best a 42 Mbps DS3 line can and should be split up, but how is it going to be a more strategic national policy tool to allow the industry to grow unfettered? The thing about technology is that once it starts it grows. The prudent thing to do right now which the FCC has attempted to do is to allow it to expand by competitive means.

A further concern that Whitt[184] has is that by not having the physical layer regulated the ensuing vertical integration which may occur will cause ILECs not to use new innovative services like VoIP services. The question could be asked such as that posed by John Havick (2005)[185] as to whether it is not possible to regulate only the physical layer. In later discussions that deal with the actual technical aspects of this issue I will illustrate that the intelligence in the network structures that are used depend and rely also on the physical medium. The total intelligence package of a service is made of different components that rely on each other. To arbitrarily choose a component for regulation as is being advocated by Whitt and others will not be an efficient method of regulation. This

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[182]102D Congress 2d Session, House of Representative, Report 102-628, Cable Television Consumer Protection and Competition Act of 1992, http:/www.fcc.gov/Bureaus/OSEC/library/legislative/histories/1450.pdf.
[183] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p658, Federal Communications Law Journal, 56, May 2004, Number 3.
[184] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p659, Federal Communications Law Journal, 56, May 2004, Number 3.
[185] John Havick, Georgia Institute of Technology, September 2005.

is not an easy issue to advocate regulations for. Notwithstanding this , Whitt has identified two methods of correcting this problem by either using a quarantine method which confines the movements of a monopolizing firm by preventing them access into upper layers or regulating the prices that the firm may charge. He cautions against quarantine and advocates price regulations**.**

Again, in this instance, where although the concerns of Whitt may be seen as valid, they are ones which may not come to pass. With regards not having full use of services such as VoIP, this is not something that is not likely to happen. This is because, this is a technology that is currently being used by ILECS in their own service offering now. WordiQ notes that:

"IP telephony is commonly used to route traffic that may be originated from and terminated at conventional PSTN telephones. VoIP is now widely deployed by carriers, especially for international telephone calls. Most commonly, users are completely unaware that their telephone call is being routed over IP infrastructure for most of its distance, instead of over the circuit switched PSTN."[186]

This is further evidence that with incentives to implement better infrastructures in the physical layers, competition will invariably cause ILECs to offer these services, because if they do not, then others will.

Citing Farrell and Weiser (Whitt, 2004, p660), Whitt concedes that even though among vertical integrations, when the principle of Internalizing Complementary Externalities (ICE) is used, monopolists provide and deny access to their platforms according to what they perceive as efficiency reasons for allowing this or not . This their action thereby self corrects their markets, he notes that there are failures in ICE that act as exceptions which may cause monopolists to prevent application layer innovations. For him the

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[186] Wordiq.com, Corporate and Telco use of VoIP, http://www.wordiq.com/definition /VOIP.

answer is using layers analysis which help isolate instances within layers where a possible monopoly situation may extend from one layer to another and obstruct competition. The thing is he has not been able to provide a mechanism or process for which this analysis should take place or the components of this mechanism that should indicate a monopoly situation in a current Internet driven market. As a result of this it is unclear as to what stage and when the layers model should be used to analyze the situation and what the components of the analysis should be**.**

Whitt [187] agrees with Solum and Vint Cerf that the FCC's removal of regulations on broadband platform was not done in the interest of the public as the FCC asserts, but rather that this move would stiffen innovation by allowing uncontrolled vertical integration growth, the literature of the Law shows however that the commission it seems looked at a broader aspect of this technology in making their decision and the FCC wrote as follows:

"The Commission's primary regulatory challenge for broadband is to determine how we can help drive the enormous infrastructure investment required to turn the broadband promise into a reality. This challenge is squarely raised in our consideration for unbundling rules for last mile facilities". (Triennial Report, 212, p 133)

The FCC therefore sees this challenge as been met in the following manner and writes with regards to broadband services as follows:

"We decline to require incumbent LECs to unbundled the next generation network packetized capabilities of their hybrid loops to enable requesting carriers to provide broadband services to the mass market."(Triennial Report, 288, p172)

The reason they gave for this is one which in this regards then, the FCC can be seen as trying to create an environment that is both competitive and just. The FCC wrote:

[187] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p661, Federal Communications Law Journal, 56, May 2004, Number 3.

“We conclude, however, that applying section 251(c) unbundling obligations to these next-generations network elements would blunt the deployment of advanced telecommunications infrastructure by incumbent LECs and the incentive for competitive LECs to invest in their own facilities, in direct opposition to the express statutory goals authorized in section 706.”

With regards Voice over IP, in general Whitt [188]is against regulating this service and notes that regulating the upper application layer may not be the most appropriate since there is not a direct link to a fixed lower layer technology. Furthermore, according to him, VoIP should not be regulated in the same way as the physical networks because, it is an application and as such does not share an adjacent boundary with the network on which it operates. As a clarification to his argument here, I will like to add the fact that services are integral parts of networks and vice- versa and as a result of this as will be shown later, in digital networks, services and network structure which in this case he alludes to as the boundaries are not meant to be construed as such as the layers are facilitators not restrictors. However, he continues that failure to regulate the upper layer should not cause concern as such regulations may not be warranted. Here he associates the VIOP service as a market and does not link it to any particular layer. He however believes that the facilities especially those that are related to the last mile elements should be regulated – in this regards then it can be taken that he is of the opinion that it is the network elements that provide the transport of VoIP that should be regulated.

[188] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p664-665, Federal Communications Law Journal, 56, May 2004, Number 3.

Other Policy Issues

To complete his paper Whitt discusses some other policy implications which I will briefly touch on here.

1. Jurisdiction

In this area, Nakahata according to Whitt believes that the FCC may be most suited in using its cease and desist authority to bring about change especially in the areas that may have controversy.[189]

2. Interconnection

interconnection issues address network effects as a source of market power as opposed to market power obtained from control of underlying bottleneck in lower layers. [190] With regards to interconnection, Whitt [191] is of the opinion that the layers model will help in policy making in evaluating relationships at different layers. The process of the evaluation will involve regulated obligations based on market power. He has identified that providers of “access, transport and applications layers” will be subject to these regulations. His primary concern is that legacy networks and new IP ones can communicate. In this regards it asks the question: What will be the basis of the regulation? –In itself regulating alone because of market power is not the end in itself. It may be that a provider of a service has superior service even with competitive forces in place that allow consumers to gravitate to its product/service rather than others. Given

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[189] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p666, Federal Communications Law Journal, 56, May 2004, Number 3.

[190] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p666, Federal Communications Law Journal, 56, May 2004, Number 3.

[191] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p666, Federal Communications Law Journal, 56, May 2004, Number 3.

that such a scenario may occur, should the provider be 'penalized' when there is provision of excellent service and allows for competition with non discrimination? In this instance then, basing a regulated policy solely on market power is not going to provide or be the right regulatory tool.

For Nakahata (Whitt, 2004, p666), interconnection issues that involve market power are related to what he termed network effects. Network effects are essentially utility gained by the number of users. Metcalf has calculated this to be the square of the users of the network. He distinguishes these from bottleneck facilities market power as well as that of market power from vertical interconnection and access power. He notes that this has been a concern for regulators. In reality, network unbundling is essentially a type of layer crossing and it can be construed as a type of vertical interconnection between vertical layers of any network model and a horizontal interconnections between devices of the same layer similarly in any network model. The information travels along channels and it only when it gets to a node or a network device that it is looked at for further forwarding either at the horizontal level or for vertical connecting to another level.) In this regards, then, unbundling of network elements is in actuality, a method of decreasing any adverse effects caused by network interconnections. As a result of this it is true that current regulations that are in place handle this. The challenge for the FCC in the future will be to make sure that the new networks that are created which will be based on line speeds and technological innovations, maintain this interconnectedness. Given the nature of the Internet itself, the intelligent network elements and devices that are developed will have to maintain this structure, for the internet to maintain its current goal of openness. In that regards, then, concern about interconnection issues will really be moot as the Internet itself will correct any instances where closure or marginalization is experienced.

3. Inter-carrier Compensation

Whitt[192] is of the opinion that the current ruling that is in place that does not allow information service carriers to pay access charges should be kept. In 2005, the FCC's chief of Policy Development indicated that the FCC will work on a reform of Intercarrier compensation rules. [193] This is because according to Pepper, the fees that carrier charge for a minute of telephone traffic varies from different factors from a fraction of a cent to about 34 cents per minute. The new fee structure will be to promote a fair and competitive system.

4. Universal Services

Whitt [194] is in support of doing away with the current method of using revenue to determine universal services contribution for a method that utiltizes a flat rate based on the physical connection to the physical layer. In this regards he supports the views of Nakahata and Weinberg, who recommends using the layers approach as this will make universal services primarily a physical layers issue. To this end Weinberg will do away with the distinctions of basic(telecommunications) or enhance(information services) making FUSF a physical infrastructure problem.

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[192] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p667, Federal Communications Law Journal, 56, May 2004, Number 3.

[193] Paul Kapustka, Intercarrier Compensation Next on FCC's Radar, Information Week, Jan 5, 2005, http://informationweek.com/story/showArticle.jhtml?articleID=56900869.

[194] Richard S. Whitt, A Horizontal Lea Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p668, Federal Communications Law Journal, 56, May 2004, Number 3.

This will however, provide an unfair advantage to enhanced services providers. This is because the reason behind Federal Universal Service Fund (FUSF) is to bring services to those parts of the nations which would otherwise be without. In this regards, then, the onus is not on allowing the market forces to decide this outcome, because it is not in the interest of the market to do so, rather, it is the duty of those who represent the public to make sure that this important service is equitably provided for by both information and enhanced service provider. Rather than use a connection methodology, then, deals only with public networks, in reality then, a method has to be developed that allows all to contribute even if it is by adding small amounts of taxes.

Whitt [195]is of the opinion that VOIP will not be subject to FUSF, because this cost will be recovered from telecommunications services like broadband regulation. However, with broadband services getting regulated as information services, then the possibility exists will be that this service may disappear. Whitt[196] recommends that matters relating to consumer welfare should be dealt with at the physical layer. However, in this instance to effectively use the layers model, the different layers where the services impact the layers the most should be the ones in which they are regulated in. To regulate a service in a layer in which it is not the correct one would result in a violation of one of the principles he has identified. This will result in this instance misusing the layers model and trying to make it fit some standard that is not part of its composition as he has identified it.

[195] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p669, Federal Communications Law Journal, 56, May 2004, Number 3.
[196] Richard S. Whitt, A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model, p669, Federal Communications Law Journal, 56, May 2004, Number 3.

What essentially the FCC has to research is whether or not, universal services are really necessary in light of the new technological innovations. If they are then the exact nature of what is needed should be further investigated and planned for not only by the FCC but also by Congress.

The last four chapters looked at length at Whitt's paper and provided other viewpoints to his arguments for an alternative model to the Silo Model for telecommunications regulations. Aspects of the Internet were looked at as his proposed model the Layers Model, is based on the protocol standards model of the Internet. It was shown that the current structure of the FCC, the main policy implementation body of the Telecommunications Industry has by proxy a structure that allows for it to be effectively managed currently but that this may change. Furthermore, some of the limitations of the proposed model were highlighted and discussed.

CHAPTER 11

NETWORKS AND THE LAW ANALYSIS

The past chapters looked extensively at the literature about regulating the Telecommunications Industry using the horizontal layers regulation. I asserted that the structure of the technologies that use the Internet are built on the way that the law is arranged. This chapter will try to show that because of the structure the network elements, services are similar. I will show this from the technical point of view. First however, this chapter will look at the individual parts of the network to see from the basic level how the internet is structured and it linkages to telecommunications and telephony in particular.

Is Telecommunications services the same as information services at the very core? This is what this section will try to see. If this is the case, then there should not be any distinction between a telecommunications services carriers and VoIP providers who are currently listed as information service providers. This new discussion will be done in this and subsequent chapters. This chapter will look at the technologies of telecommunications that are involved.

Protocols Overview

Computers use communications or network protocols which define precise rules for specific standard or modes by which these devices communicate with each other across networks. Protocols allow computers to make connection, communicate with each other, and share information across networks in an end-to end manner. Protocols are built in layers with each layer performing a specific function. Since protocols are developed by different subgroups, to allow for seamless interconnections, overlaps may occur among layers and some like Schatt (1995) [197] see this overlap as a major disadvantage of the layers protocol schema. Each layer in a protocol stack provides a supporting function for the layer above in the stack and gets support and service from the layer beneath it.[198] Usually protocols are grouped together to form protocol stacks, which are also known as Protocol Suites or Families and these give the specific format and manner by which, hardware and software components can communicate. Protocol suites are defined by Request For Comments (RFCs).

RFCs are "numbered Internet informational documents and standards" that are used in the development of software and they are usually set by different standards organizations[199]. One such protocol suite is the Transmission Control Protocol/ Internet Protocol (TCP/IP) and this is the protocol around which the Internet has been built. In general, the TCP model is an upper-layer protocol that is implemented in software.[200] Typically, it has a Network, Transport and an Applications layer and its lowest layers which is the IP portion can be implemented as either a single Data Link Layer or two layers, which are the Data Link and Physical Layers respectively. The latter implementation allows manufacturers flexibility in how their products are designed around this protocol. The TCP/IP Protocol is seen in Figure 1.

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[197]Stan Schatt, Linking Lans, Second Edition, p49 Mcgraw-Hill Inc. ,1995.
[198] International Engineering Consortium, Distributed Network Intelligence, 2, Background,
http://www.iec.org/online/tutorials/sist_net/topic02.html?Next.x=35&Next.y=19/.
[199] Dictionary.net, What does RFC means? Dictionary.net, http://www.dictionary.net/rfc
[200] Ed Taylor, TCP/IP Complete, p6, McGraw Hill, 1998.

TCP/IP Protocol
Applications (Content) Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

Figure 1

Another Protocol suite is the protocol standard developed by the International Standards Organization (ISO) and the Consultative Committee on International Telephony and Telegraphy (CCITT). This standard is known as the Open Systems Interconnection Reference Model (OSI) and it is a seven layers model. In this model, the TCP/IP model is extended to include a Session, Presentation and Applications layers. This model is seen in Figure 2.

OSI Protocol
Applications (Content) Layer
Presentation Layer
Session Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

Figure 2

In telecommunications, especially in the areas of networking and computer processing, it is usually helpful when service or applications protocols are discussed to see how they compare to these standards as these standards define the general functionalities that layers of any specified protocol will follow. The match up of these two protocol suites are given in Figure 3. In Figure 4, the functions of the different layers and examples of different protocols that these layers support are also shown.

Comparing the OSI and TCP Protocol Suites		
Layer #	OSI Protocol	TCP/IP Protocol
7	Applications Layer	Application Layer
6	Presentation Layer	
5	Session Layer	
4	Transport Layer	Transport Layer
3	Network Layer	Network Layer
2	Data Link Layer	Data Link Layer
1	Physical Layer	

Figure 3

Layer	Functions[201]	Examples
Application	Support End user applications File Transfer, Access and Management	HTTP , VoIP, H.323 SMTP
Presentation	Data Compression, Encryption Syntax resolution.	XML, XDR
Session	Administration and Control of sessions between two entities. Organized Exchange of Data Synchronization.	TLS, SSH
Transport	Transparent Data Transfer and Transport. Provides Dynamic Routing.	TCP, UDP,
Network	Delivery Service of Messages Segmenting of large messages Error Recovery Flow Control	IP ICMP
Data Link	Error Detection, Control Flow Control	Ethernet, ISDN, 802.111, WiFi, Token Ring, FDDI, ATM, PPP,
Physical	Control of Physical Circuits to deliver bits,	Electricity, radio, microwave, satellite, cable

Figure 4 The OSI Protocol Standard

[201] OSI Layers, Http://www.ecst.csuchico.edu.~pingc/HOMEWO~1.HTM.

Protocols facilitate network process in that they provide the methodology for the total flow of information from the source computer to the receiving computer. They do this by ensuring that each previous layer provides information for the next layer while reading information provided to it by the previous. The provided information is in the form of packets known as frames. As a message travels across layers from the sending computer, each layer, with the exception of the physical layer, adds control information to the headers of the frames for the receiving computer to use. At the receiving end, each layer removes the header and sends the message to the layer above it. In a protocol stack then, movement of information is from "lower" layers to "higher" layers in a vertical manner when message is being received and from higher layers to lower layers when message is being sent out and these form the basic plans of networks.

In network structures, the protocol stacks of services that are utilized by either senders or receivers are replicated in each host computer. This process allows disparate hosts to communicate. The IEC notes[202] that with protocols:

"It is this replications that provides the framework for interoperability between compatible member hosts to execute in a distributed setting … For distributed processing techniques, the OSI stack broadens the scope of basic interconnection and opens up the discussion to include how the interconnected elements may actually use and benefit from the connection mechanism at hand. Successful protocol agreements are achieved between distributed network elements through the use of the OSI model."

In networking, the functions of the OSI Model as a standard is similar to that of the TCP/IP model and these two have become the major network standards against which other networking protocols model themselves so as to have open connections. Using the protocol standard of the TCP/ Model and the OSI for the interconnecting of computers in computer networks are the following architectures: Microsoft Network Systems, The

[202] International Engineering Consortium, Distributed Network Intelligence, 1., Introduction, http://www.iec.org/online/tutorials/sist_net/topic02.html?Next.x=35&Next.y=19.

SUN Network File System Suite, Linux Network Systems, Xerox Network Systems (XNS), the IBM NETBEUI Protocol system, 10BaseT (IEEE 802.3), Fast Ethernet (IEEE 802.3U), Gigabit Ethernet (IEEE 802.3Z), 10 –Gigabit Ethernet (IEEE 802.3 AE), 100 VG AnyLAN, IBM's IEEE 802.5, X.25 Packet Hybrid, Apple Ethernet Network Systems, Virtual Private Networks, Cable Modems, WI-FI (IEEE 802.11), Asynchronous Transfer Mode (ATM), Integrated Services Digital Network (ISDN), Digital Subscriber Networks (DSL), Fiber Distributed Data Interface (FDDI**)**, Metropolitan Area Networks (MAN- IEEE 802.6), Wide Area Networks (WAN), Novell Netware Network Systems, Simple Network Architecture Switching Services (SNASW)[203], Signaling System No.7(SS7/CC7), SONET, Virtual Private Networks (VPN**)**, Point-to -Point (PPP)[204], Point-to-Point Tunneling Protocol (PPTP**)**[205], and MPL**.**

Essentially, what these different vendor products mentioned above do is use the 'guidelines' of the OSI and TCP/IP models as standards to provide products (services and elements) that may be defined by a specific vendor protocol but which conforms in general to the OSI or TCP/IP standards. Since they conform in general to the OSI or TCP/IP model this allows for open communications and flow of information on different vendor platforms even as different and varied makes of devices are utilized.

This variety in the vendor market, has allowed for the growth of the Internet related services specifically as well as the Telecommunications Industry in general. It has

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[203] CISCO SYSTEMS, SNA/IP Solution, Business Case for Integrating SNA & IP in Enterprise Networks, http://www.cisco.com/en/US/netsol/ns340/ns394/ns74/ns144/net_value_proposition09186a0080adc68.html.
[204] Nortel Networks, http://www25.nortelworks.com/library/tpubs/passport/v412/html/ospf614.html.
[205] Jawin.com PPTP Point to Point Tunneling Protocol, http://www.javvin.com/protocolPPTP.html.

caused the innovations of different networking elements that are now available for the structuring of networks which has contributed enormously to the growth of the Telecommunications Industry.   This openness of ideas and the exchange of information has also brought with it some new problems which concerns how products new and old as well as services traditional and new should be regulated. As will be discussed all through out this study, the services that are now developed and the structures that support these services are interconnected in a way that although they conform to the either of these two major standards models they do so in ways that suggests the traditional preconceived layers method of regulating may need some modifications. At the heart of this new phenomenon is the network.

Networks Overview

A network is made up of two **logical** systems a traffic system and a management system with the traffic system serving the end users and the management system supporting the traffic system. [206] Olsson (2003) notes that this general architecture is valid for all network architecture.[207] In networks, the traffic system is affected by the demand of services that are provided, and currently, pushing the amount of traffic needs are services such as multimedia over IP MM/IP; voice services such as Voice over IP (VoIP), Voice over ATM (VoATM), Voice over Frame Relay (VoFR). Also, other traffic intensive needs are music download services, mobile internet services, video conferencing, traditional E-commerce, manufacturing, industrial, World Wide Web uses, gaming and E-mail services. These and other user services are used by governments

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[206] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 51, John Wiley and sons Ltd, 2003.
[207] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 51, John Wiley and sons Ltd, 2003.

institutions, universities, and schools, commercial business as well as non-profit and the general public.

As the amount of users that avail themselves of these services that are Internet related increases, it causes an increase in the amount of traffic that is carried over the different networks. Currently, these services are bandwidth intensive and higher and faster speeds of communications are required to maintain the quality of service that consumers want. As an example, customers may want to download a DVD that is about 4 gigbyte. Depending on the speed of the line used, this may take less than 30 minutes on high speed lines to a number of days on slower dial up lines.[208] This ever increasing demand for higher speeds has resulted in an accelerated growth of the broadband industry which provides the high capacity bandwidth that is needed for the transmitting of files large sizes at a faster rate.

Bandwidth is the amount of data that can be moved through a connection at any given time.[209] Band width capacities have grown increasingly faster from DSO line speeds of 64 Kbps[210] to DS-1(T-1) which transmits at 1.54 Mbps, [211] to 10 Base-T Ethernet which transmits at 10Mbs[212], to Gigabit Ethernet which transmits at 1000Mbps,[213] to 10 Gigabit Ethernet which transmits at 10 Gbps, to OC192 lines which in groups of 10 can

[208] International Telecommunications Union, http://www.itu.int/osg/spu/presentation/2003/BOB-FINAL2.pdf.
[209] Wordiq.com, Bandwidth, http://www.wordiq.com/bandwidth.
[210] Dev Shed DS3 –T-3, What is a T-3 Line/DS3, Technology, http://www.devshed.com/ds3.
[211] Stan Schatt, Linking Lans, Second Edition, McGraw-Hill, Inc, p133.
[212] Dev Shed DS3 –T-3, What is a T-3 Line/DS3, Technology, http://www.devshed.com/ds3.
[213] Dev Shed DS3 –T-3, What is a T-3 Line/DS3, Technology, http://www.devshed.com/ds3.

give a capacity of 472Gbps.[214] The end result of this progress is that it has resulted in faster networks and has altered telecommunications processes in general.

According to some, the evolution of high line speeds, bought with it a shift in the way the architecture of telecommunications networks are seen from the vertical PSTN networks which were single service vertically integrated networks to horizontal networks. The vertical networks, had their own protocols, nodes, equipment and terminals that use different principles and procedures in order to maintain reliability. [215] In that regards then, they were considered to be point to point networks.

The argument continues that horizontal networks on the other hand, have autonomous layers, in which each layer has its own management, control and resources features. Each layer in the network uses protocol components, and these define how similar layers interact with each other as well as how the layer above and below a particular layer will interact with it. The end result of this is that horizontal layering allows each layer to evolve independently of each other and to remain independent of the technology. Also, it allows multiple service networks to end up using the same transport layer.[216] From this ensuing discussion, it can be seen that protocol layering allows telecommunications networks to talk to each other both in a vertical as well as in a horizontal manner. It does this by allowing (nodes) to talk to each other in a vertical as well as horizontal manner and this is done through service net and transport networks.

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[214] Stephan D. Cote, Fiber Capacities, http://www.bralyn.net/etext/reference/computer/fibercap.html.
[215] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 54, John Wiley and sons Ltd, 2003.
[216] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p61, John Wiley & Sons, Ltd, 2003.

Service Networks

Across a network, the end user applications are the services that are offered, and they are essentially stacks of protocols such as VoIP, E-Mail, Video Conferencing, etc. These services operate in an end to end mode, that is they occur between the service initiator who is the sender and the service recipient who is the receiver. As a result of this each service between two user nodes becomes and forms a 'Service Network'. In this 'service network', what ends up happening is that several applications (end user services) can use the same 'path' or route at the same time. The services can originate and terminate from therefore one or several end user nodes . This allows multiple services networks to share the same 'Transport Network'. The term 'transport network' is not to be confused with the term Transport Layer in this instance.

Transport Networks

The Transport network is in this case taken to mean the network of a service provider and this network can be built on one of the many prevailing network architecture types such as Sonet, Gigabit Ethernet, ISDN, ATM, etc. The Transport Network of the service provider is made of essentially two basic components or capabilities. These are 1) The medium that is used. 2) The Intermediary or connecting devices that is used by the medium.

1) The medium used is basically one of two forms: a) Wireless or b) Wired. Both wired and wireless medium use energy ranges from the electromagnetic spectrum for transmission.

a) In the wired medium, physical entities such as Fiber Optics line, 150 Ohm Balanced Shielded Copper Cable[217], Twisted pair copper telephone lines, Coaxial lines are important and are used. Soon electrical wires will be used as medium. This is because although this is still in its infancy, the FCC recently gave permission for electricity to be used as an Internet platform and hence as a telecommunications medium.[218]

b) In the wireless medium, waves such as radio, microwave, and satellite wave are important and are used.

2) The Intermediaries, are the 'intelligent' network elements that coordinate the movement of the information that relate to user and program applications. They are the server components, gateways, gatekeeper devices, routers and bridges, and other intelligent devices that allow the services to travel over the medium. Among the functions these devices perform is that of making the connections between the different devices, keeping record of the routes used as well as how long a resource was used.

The intermediary devices ensure that horizontal message exchange across similar layers occurs as well as vertical 'message swap' to different layers. It uses the components of the network to allow information to be transported between end points (nodes) while making allowance for the fact that the information will be transported on networks of different capabilities**.** Intermediary devices work the same way from small local area networks to global enterprise networks.

From this discussion, it can be argued that the intelligence in a network is not limited to particular devices or components but that all of the components a network individually

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[217] Cisco Systems, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/warp/public/cc/techno/media/lan/gig/tech/gigbt_tc.htm.

[218] Seattle Post Intelligencer, 3 State Utilities may offer Internet via power lines, Saturday, October 16 2004, http://seattlepi.nwsource.com/business/195511_powerline16.html.

yet mutually form its intelligence because they give it its intrinsic abilities, capacities and capabilities. Also, the different abilities, capacities and capabilities in turn interact with each other to maintain the intelligence and are the ‘intelligence’ in the networks. As a result of this the intelligence (capability) in a network can be summarized as follows:

Intelligence (Capability) of networks depend on the following :

- the medium – wired or wireless,
- The range of the medium that is used, radio, microwave or satellite
- the speed that is used – DSL, 10 Base-T or OC192
- the Transport network architecture and technology between the End user nodes – i.e., End user A (Sender) is on an ATM network while End user B (Receiver) is on a Gigabit Ethernet
- The topography of the devices – The responsibility the device has been programmed for on the different network devices.

In this regards then, in comparison to a vertical ‘exchange’ networks, in which all who used the network had access to different end user services (applications) but at the same capability and at the same speed, in horizontal networks, there is a difference. This is because depending on the Information Services Provider that is chosen, a consumer has choices between which particular service they may want as well as in choice of service providers. What this allows to happen is that if it is the case that a service user needs is not offered by a particular provider they can always change to another service provider. Also, in horizontal networks, as opposed to vertical networks, the access speed is different as Information Service Providers can now offer choices among different access speeds.

In comparing “horizontal competitive” service networks to the vertical Public Switched Telephony Networks (PSTN) what at first seems obvious is that in PSTN networks, regardless of where a person was, all had access to the voice line at the same speed and the differentiating factor was the service that was chosen. In horizontal networks, two things are now important, a consumer can make choices in services and also, can make choices at the line speed at which they receive the services they have chosen. Usually line speeds are based on cost.

After looking at this brief introduction of protocols and the networks over which they travel, the next stage in the linkage is to look at the applications or provider services that use the networks. These provider services or applications are part of the protocols in the network and provide the functions of the networks.

Applications Overview

Protocol layering allows the methodologies by which technologies operate to be structured in a manner that causes them to be built on top of each other. The methodologies are in actuality the application programs (operating system and user client software) and services and these reside in the different network elements. The modules of particular technologies are therefore created to perform within certain layers of a protocol. This allows the layers of the services or application to be relegated or 'distributed' to specific network elements or devices. An application can be conceived of as the aggregate of many software modules. The aggregate module is the protocol stack or protocol family that supports a particular operating system, networks operating system, end user application or service such as for example VoIP. In the case of VoIP, each layer in the VoIP, the total application or service is the protocol stack. Each layer in the VoIP defines a particular function and that layer function is described by a sub protocol of that protocol stack.

In the case of VoIP for example, this application can be represented by the SIP protocol. In the Sip protocol stack there are 1) the SDP – Session Description Protocol 2) The Session Initiation Protocol as well as the Q.931 messages protocol[219]. The different parts of the SIP protocol are different applications that are used by intelligent device such as a routers and gateways to get information from one end node to the other. These protocols give devices their intelligence or another way of looking at this is that the applications as programs give devices their intelligence. Also, another added important function of intelligent devices is that they allow for the connecting of routes across networks using network devices such as for example, routers which generally are bridges across similar networks while gateways are bridges across dissimilar networks.

These and other such facilitator network devices which in the past were regarded as boundary devices allow the functions of the networks to progress smoothly. It is the intelligence in the devices that constitute intelligence in a network. Network intelligence uses intelligent devices which have specific programs modules or specifically assigned responsibilities to aid the transfer and movement of service from one point to another. They allow one end user or one end node point to connect to the other and exchange information while forming intelligent networks. The end result is that services and host devices communicate across these intelligent networks which span the globe.

[219] Anders Olsson, Understanding Changing Telecommunications, Building a Successful Telecom Business, p 392, John Wiley & Sons, Ltd, 2003.

The resulting network structure is one that has distributed nodes of intelligence running over a Transport or bearer Network. The connection between the nodes is given by controlling signals or management /built in controls.[220] According to Rosenbrock (1993), Intelligent Networks are architectural concepts used for the creation and provision of telecommunications services that utilize in an extensive manner information processing techniques.[221] They use network resources and allow the customer to control some of his specific service attributes. Daryani et al (1993) describe Intelligent Networks as distributed processing environment that connects two different technologies, telephony and Information Technology (IT).[222] Intelligent Networks are known by several names such as Third Generation networks – 3G or Multi Service Platforms (MSP) or Next Generation Networks(NGN)). In these networks, information movement from point to point is in the form of electrical energy. It is this energy that travels as signals across the different mediums. In the past the regulation of telecommunications was based on the medium that this energy traveled or by the content of this energy and the message it had.

Medium

It is no coincidence that Title 47 of the USA Code collection is listed as Telegraphs, Telephones and Radiotelegraphs. The origins of the codes that govern telecommunications are in radio. Rationalizing a reasoning for this type of classification Head,(1956) wrote of radio waves:

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[220] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 83, John Wiley and sons Ltd, 2003.

[221] Karl Heinz Rosenbrock, European Standards for the Intelligent Network, p 4, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, IOS Press 1992.

[222] P Daryani, I. Faynberg, S. J Griesmer, M.P Kaplan, A.L Waxman, Object –Oriented Modelling of the Intelligent Network and its application Universal to Personal Telecommunications Services. p 391, 1993.

“Radio differs in important aspects from sound energy. One major difference is that radio energy travels through space at the rate of about 186,000 miles (300,000,000) meters per second. This means a radio wave can travel around the earth seven times in one second. … Sound on the other hand travels in air at only about one fifth of a mile per second. This means radio waves travel over nine hundred thousand times as fast as sound waves.[223] 300,000,000 meters per second is also the speed of light is no mere coincidence, for light energy and radio energy are basically one and the same thing.[224] ….

Currently also, technology is making sections of the electromagnetic spectrum which were not used before to be extensively utilized. Electromagnetic energy is actually radio waves. They exist as different frequency waves in the range of waves between radio and cosmic wave and even though they have varied characteristics all have the same velocity of 300,000,000 meters per second.[225] In telecommunications, it is this energy that is harnessed in the transmission of information across network media. The energy travels or is channeled through a medium which is the physical format through which voice, data or multimedia information is transported as energy. Medium can be either a) wired or b) wireless. In wired format, physical wires are used in the channeling and twisted shielded pair, coaxial cable, and fiber optics are medium types that are currently in use in this area. Wireless format makes use of satellite that channels microwaves and radio waves.

Wireless

In wireless format, medium can take 2 main formats which are primarily radio waves and microwaves. Satellites links transmit microwaves[226] and these links are used by Cable TV Providers to send both broadcast material as well as to provide Internet

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223 Sydney W. Head, Broadcasting in America, p8, Houghton Mifflin Company, 1956.
224 Sydney W. Head, Broadcasting in America, p8, Houghton Mifflin Company, 1956.
225 Sydney W. Head, Broadcasting in America, p9, Houghton Mifflin Company, 1956.
226 Sydney W. Head, Christopher H. Sterling, Lemuel B. Schofield, Broadcasting in America , A survey of Electronic Media, seventh edition, p115, Houghton, Mifflin Company, 1994.

services. Microwaves which are also known as Super High Frequency (SHF) have wave lengths in the range of 1 GHz to 300GHz. Although microwave spectrum ranges from 300 MHz to 1000GHz, only ranges between 1 – 40 GHz are used.[227] Currently, microwave ranges used have very little government regulations on them.[228] Furthermore, licenses to use these part of the spectrum are not always required.[229] Using the microwave spectrum are microwave ovens, cordless phones(which either use the 900 MHz or 5.8 GHz spectrum[230], and included in this is the Wi-Fi 2.4 MHz band. Wi-Fi is a wireless medium that is usually available in Internet cafes and airports globally and it is part of the IEEE 802.11 family standards of protocols.[231] The intelligence in the protocols of the medium facilitates the information flow in this component of a network.

Wireless Protocols

In order to correctly channel information between user services and endpoint users, wireless mediums use protocols. One such protocol is Wi-Fi. Wi-FI is a set of Wireless LAN protocols developed by IEEE as 802.11 Standards Family. The 802.11 standards are used primarily by businesses. A wireless standard that is used for home networks is the Home Radio Frequency (HomeRF)[232]. Currently, Wi-Fi protocol standards are included in the IEEE 802.11 standards family. The protocols standards in this regards can be viewed as applications (user services) that are improved upon with newer versions of 802.11 additions. As such as 802.11 (a) can transmit at over 54Mbs

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[227] Wordiq.com, Microwave, http://www.wordiq.com/definition/Microwave.
[228] Wordiq.com, Definition of IEEE802.11, Wordiq, http://www.wordiq.com/definition/802.11b.
[229] Wordiq.com, Definition of IEEE802.11, Wordiq, http://www.wordiq.com/definition/802.11b.
[230] Wordiq, Definition of Wi-Fi, http://www.wordiq.com/definition/Wifi.
[231] Wordiq, Definition of Wi-Fi, http://www.wordiq.com/definition/Wifi.
[232] Webopedia, HomeRF, http://www.webopedia.com/TERM/H/HomeRF.html.

transmission rate while 802.11(g) which was developed after 802.11(a) can exceed 108Mbs transmission rates.[233] As applications, they are sometimes incorporated as part of the product offering of some computer manufacturers. An example of this is seen in Apple Computer System's use of 802.11(b) under the trademark "Airport".[234] In 2004, 802.11(n) was announced by the IEEE and this wireless protocol will transmit at up to 250Mbps at its completion.[235]

Although in 2002, CEWindows.net ascribes to an 802.11z standard which will be used for Wireless Encryption,[236] EE Times reported in 2005, that the IEEE had just started work on IEEE 802.11u and v which will make standards for higher layer interactions.[237] At the Z level it is expected there will be standardization of all the formats which have been using the different features already in Wi-Fi features of 802.11 implementations into an integrated IEEE defined standard such as 802.15. 802.15 is a Wireless Personal Area Network (WPAN) – IEEE 802.15. It is an integrated standard that was developed by IEEE to have Buetooth standard specification. WPAN allows PCs PDAs, Mobile Phones, pagers and other hand held devices to communicate and interconnect with each other.[238] Currently, Wi-Fi is complemented by 802.16. This protocol standard is known as Worldwide Interoperability for Microwave Access - WiMAX.[239] WiMax connects 802.11devices to Cable and DSL devises. WiMAX is similar to the ETSI standard High Performance Radio Metropolitan Area Network - HIPERMAN used in

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233 Wordiq.com, Definition of IEEE802.11, Wordiq, http://www.wordiq.com/definition/802.11b.
234 Definition of IEEE802.11, Wordiq, http://www.wordiq.com/definition/802.11b.
235 Definition of IEEE802.11, Wordiq, http://www.wordiq.com/definition/802.11b.
236 Chris De Herrera's Windows's CE Website , Pocket PC Security, Copyright 2002, http://www.cewindows.net/reviews/pocketpc2002security.htm.
237 IEEE Set to Amend 802.11 Standard, http://www.mobilepipeline.com/59302291.
238 Vivek Mlhotra, IBM, Checking in on 802.15, An Update on the 802.15 WPAN committee's work, http://www-106.ibm.com/developerworks/library/wi-checking/.
239 Wordiq.com, Definition of 802.16,http://www.wordiq.com/definition, Wimax.

Europe.[240] The protocols of mediums are also implemented with consideration for the standard OSI or TCP/IP model. This is again to ensure smooth connectivity from the medium layers to the other layers of the network.

The layers of wireless 802.15 architecture are shown in Figure 5 in comparison to the layers of the ISO OSI Model as well as the 802.11 Standards.

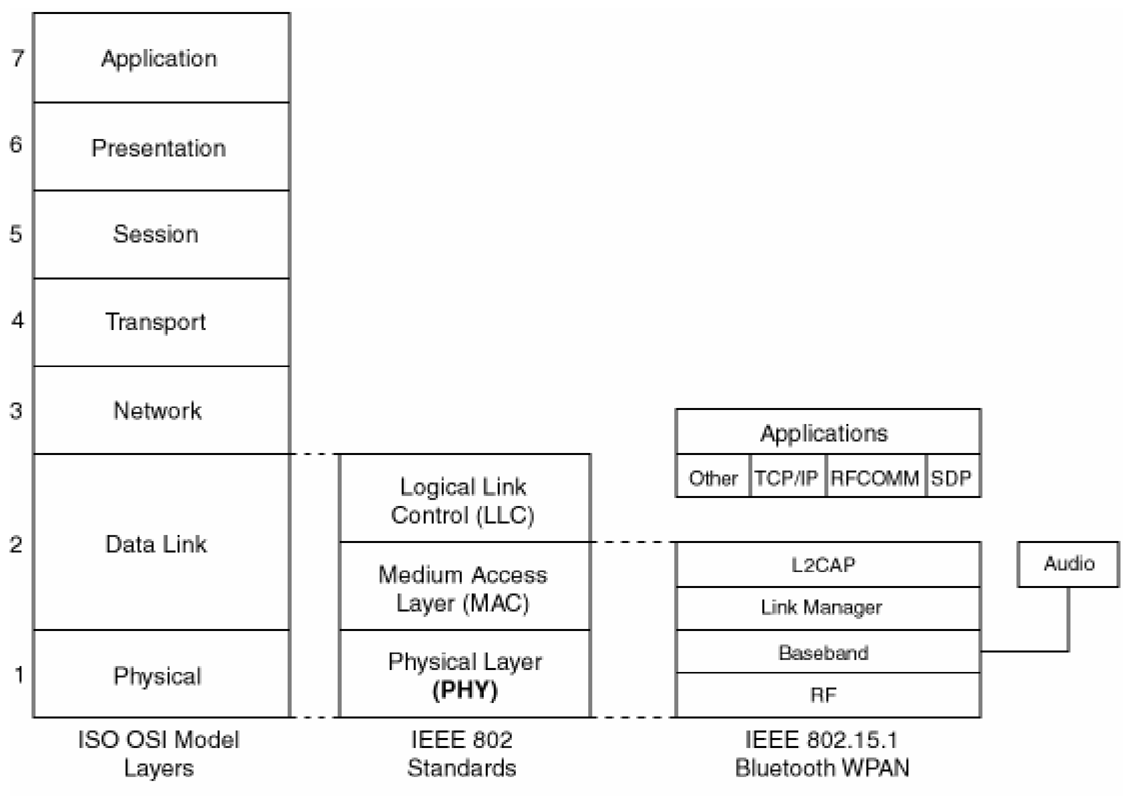

Figure 5 The Layers of 802.15 Architecture

[240] Wordiq.com, Definition of 802.16,http://www.wordiq.com/definition, Wimax.

Wired

In the wired medium, cables are generally used and these range from twisted pair shielded copper cables to coaxial cables and to the newest in cable technology, the fiber optics cable. Fiber optics cables are pure glass fibers that modulated light is transmitted across.[241] With regards to the legal environment of telecommunications, fiber optics cables have allowed the 'unbundling of networks' to occur. They are also used by Cable service providers to offer both broadcast and Internet services. With newer Internet related services, speed is very important and fiber optics transmission allows for very fast transmissions at different speed capacities. Generally, the term broadband is generally used to refer to communication connections that exceed 1Mbps. Table 2 gives some broadband connections and their transmission speeds.

[241] Sydney W. Head, Christopher H. Sterling, Lemuel B. Schofield, Broadcasting in America , A survey of Electronic Media, seventh edition, p162, Houghton, Mifflin Company, 1994.

Table 2[242] Broadband Connection Speeds

Connections	Transmission Speed
DS0*	64Kbps
ISDN (2 DS0 lines)*	128Kbps
DS1 (Tier 1 – T1)	1.544 Mbps (24DS0 lines)
E1	2.048 Mbps
ADSL2[243]	12 Mbps
ADSL2+[244]	25 Mbps
DS3 (Tier 3 –T3)	44.736 Mbps (28 T1s)
VDSL [245]	52Mbps
OC3	155.52 Mbps (84 T1s)
OC12	622.08 Mbps (4 OC3s)
OC48	2.488Gps (4 OC12s)
OC192	9.953Gps (4 OC 48s)

Fiber optics cables are usually laid down in pairs. When a circuit capacity of six fiber pairs are laid extremely high speeds are realized. This is shown in Table 3. Also, Table 4 shows speeds that are achieved when Fiber is laid down in ten groups.

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[242] Two sources were used in compiling this table;
Dev Shed, http://www.devshed.com/ds3.,
Wordiq.com , http;//www.wordiq.com/definition/Broadband_Internet_access.
[243] Wordiq.com, Asymmetric Digital Subscriber Line ADSL,
http://www.wordiq.com/definitions/Aysmmetric_Digital_Subscriber_Line.
[244] Wordiq.com , Asymmetric Digital Subscriber Line ADSL,
http://www.wordiq.com/definitions/Aysmmetric_Digital_Subscriber_Line.
[245] Wordiq.com, http;//www.wordiq.com/definition/VDSL.

Table 3
Circuit Capacities for One Group of Six Fiber Pairs[246]

	DSO	DS1	DS3	Kbps	Mbps	Gbps
OC3	12,096	504	18	774,144	756	0.7
OC12	48,384	2,016	72	3,096,576	3,024	3.0
Oc48	193,536	8,064	288	12,386,304	12,096	11.8
OC96	387,072	16,128	576	24,772,608	24,192	23.6
OC192	774,144	32,256	1,152	49,545,216	48,384	47.3

Table 4
Circuit Capacities for One Cable (Ten Groups)[247]

	DSO	DS1	DS3	Kbps	Mbps	Gbps
OC3	120,960	5,040	180	7,741,440	7,560	7.4
OC12	483,840	20,160	720	30,965,760	30,240	29.5
Oc48	1,935,360	80,640	2,880	123,863,040	120,960.	118.1
OC96	3,870,720	161,280	5,760	247,726,080	241,920	236.3
OC192	7,741,440	322,560	11,520	495,452,160	483,840	472.5

What the tables above show is that the Telecommunications Industry is poised or has the knowledge to use very fast telecommunications line speed. Networks that use these line speed will form the basis for future regulatory policies that relate to the Telecommunications Industry. Currently, however, several things are limiting factors.

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246 Stephan D. Cote, Fiber Capacities, http://www.bralyn.net.etext/reference/computer/fibercap.html.
247 Stephan D. Cote, Fiber Capacities, http://www.bralyn.net.etext/reference/computer/fibercap.html.

Among these is the fact that there are not currently available applications that will make use of such intense bandwidths, and another is that fact that these super fast line speeds are very expensive. In 2003, AT&T(Now SBC) announced that it will consolidate its legacy networks into a single global IP infrastructure - A Multi Protocol Label Switching (MPLS) based network over a intelligent optical cores by the year 2005 in a $500 million investment to improve customer services to Intra as well as Wi-Fi customers.[248] As an industry leader, AT & T sees Unbundled Network Elements Platform (UNE-P) as an "essential bridge" to next generation technologies and lasting competition and in this regards, has spent over $15 Billion on these ventures since 1998 in a competitive industry market that has invested over $150 Billion dollars already .[249]

David Dorman, Chair and CEO of AT&T considers unbundled network elements " the most meaningful competitive choice in telecommunications for American consumers and business " and recommends that this competitive trend be allowed to grow so that new services such as VoIP will be allowed to remain free of regulatory limitations.[250] He cites as an example of the success of UN-P the fact that there are 19 Million UNE based lines for consumers and small businesses. [251] In later chapter, the significance of these will be looked at in detail when the concepts of unbundling are discussed and when the technology and the legal aspects are combined.

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[248] AT&T News Release For Release Tuesday June 3rd., 2003, AT&T announces New Offers and Service Improvements for Business Customers, http://www.att.com/news/2003/06/03-11758.
[249] AT and T News Release, For News Release Wednesday, February 11 2004, AT&T Chairman says Competition is the key Driver For The Communications Industry, http://www.att.com/news/2004/02/11-12867.
[250] AT and T News Release, For News Release Wednesday, February 11 2004, AT&T Chairman says Competition is the key Driver For The Communications Industry, http://www.att.com/news/2004/02/11-12867.
[251] AT and T News Release, For News Release Wednesday, February 11 2004, AT&T Chairman says Competition is the key Driver For The Communications Industry, http://www.att.com/news/2004/02/11-12867.

Functions of a Network

With current technology, increasingly the importance is not on the application as such but on the network. To make an example of this point, Olsson, (2003) classifies voice over IP or IP telephony as " just " another application using a standard data network which uses the TCP/IP suite of protocol. He makes a very important observation about networks that will also be dealt with in later chapters. He gives as explanation of the intelligence of the network by relating it to its functions. He characterizes the logical systems of a network as its functional systems and argues that because the traffic system and the management systems provide assistance to both end users and perform management task for well being of the total network that these logical parts of a network are in actuality its functional aspects and that this generalization is applicable for all network architectures.[252] In telecommunications, the two broad categories or functional types of networks are the a) Public Switched Telephone Network (PSTN) and b) the Packet mode network.

Public Switched Telephone Networks is a term that encompasses the different equipment and facilities for the provision of phone service to the public. Dryburgh et al notes that currently this PSTN is a "network of computers and other electronic equipment that converts speech into digital data and provides a multitude of sophisticated phone features, data services and mobile wireless access."[253]

Another type of network is a packet mode networks or packet switched networks. Packet switched networks are Intelligent Networks, that use a connectionless path from

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[252] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 51, John Wiley and sons Ltd, 2003.

[253] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p81, Cisco Press, 2005.

sender to receiver to transmit information. The Internet is a packet switching network that uses the Internet Protocol and a large variety of topologies and technologies utilize the Internet Protocol as a standard for their structure.[254] In packet switched networks, the call processing portion of the network which is usually handled by the telephone switch is distributed to other network devices using the Intelligent Network design concept. Dryburgh et Al, (2005) has divided the functions of these switches into an Intelligent Network Conceptual Model (INCM).[255] His model divides the intelligence of the network and hence the switches that contain the intelligence into four planes which are primarily:

- Service plane –
- Global Functional planes
- Distributed Functional Planes –
- Physical plane – Medium

In this model, the service plane is strictly concerned with the application or service itself such as VoIP for example, while the global function plane is made up of a collection of Service Independent Building Blocks (SIBs). The SIBs are part of the Service Switching software and these software perform the service switching functions in a network.[256] The Distributed Functional plane performs or implements the Functional Entities such as for example the Call Control Agent Functions (CCAF) that allows a user to access a particular network. The physical plane is the actual physical equipment. This plane shows the protocols that are used to implement the Functional Entities (FE) of the

[254] Wordiq, packet switched, http://www.wordiq.com/definition/Packet-switched.
[255] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 330, Cisco Press, 2005.
[256] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p331, Cisco Press, 2005.

Distributed Functional plane.[257] This Intelligent Network Concept Model is shown in Figure 6. The Distributed Functional Plane is concerned with the details of a service provision.

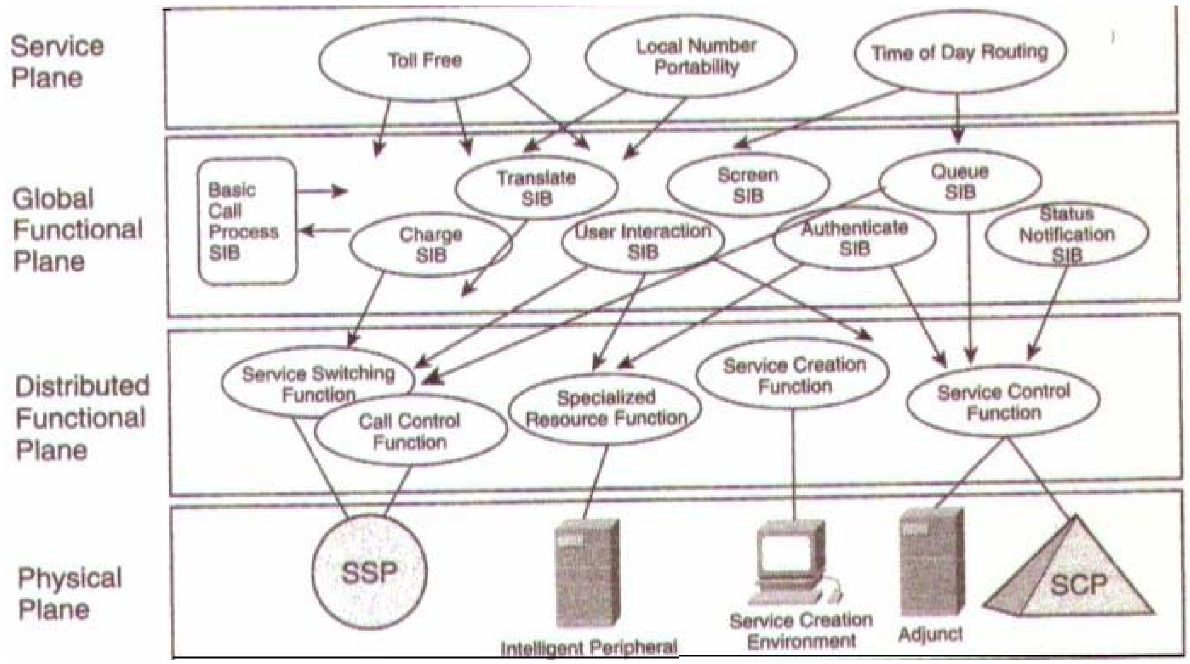

Figure 6 Intelligent Network Concept Model

Source: Dryburg

The roots of global networking and all the different architectures and topologies it entails stay true to the basic principle it started with when first two computers where connected in a network. At that time when two nodes were connected the primary aim was to present information, applications and processes on a different computer to show as if it were on the computer being accessed. This is still true today. At their basic form, what the different networking architectures do, is cause the bringing together of different spatial environments and devices which are then made to merge seamlessly to present

[257] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p331, Cisco Press, 2005.

the perception of being in the same general locale. At the core of a network, then is the Local Area Network (LAN). LANs usually connect computers in the same locality. When a dimension of greater distance is added, and LANs in different geographic locations are connected together, a Wide Area Network (WAN) develops and this may link LANs that are of disparate network types. City wide networks are known as Metropolitan Area Networks (MANs) while networks that are globally linked are known as Enterprise Networks. It is this networking structure that the FCC is starting to use as its basis for policy formulations. In the Triennial Report the FCC identified two major types of network markets – The Mass Market Network[258]and the Enterprise Market Network[259] and observed that the over 51% of competitive LECs offer their services to the residential/small business market while over 78% of BOC serve the mass market.[260]

In general LANs, WANs, MANs and Enterprise networks are usually defined by the underlying technology that is used. The underlying technology is usually defined by the speed of the network. In larger business environments, or on university campus' as well as in networks provided by telecommunications and information service carriers several different technologies are usually in place and as a way of simplifying the major transport connector, the term backbone is generally used. The flow of information across the backbone is actually the flow across the different medium of electromagnetic energy (radio waves) which has been converted into electrical energy. This flow is in the form of

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[258] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (IV)(B)(2)(50), http://www/fcc/gov/Daily_Releases?Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[259] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (IV)(B)(1)(44), http://www/fcc/gov/Daily_Releases?Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[260] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (IV)(B)(2)(50), http://www/fcc/gov/Daily_Releases?Daily_Business/2003/db0821/FCC-03-36A1.pdf.

signals. To get the signals across, switches are used which make use of signaling systems such as signaling system 7 (SS7) in USA and C7 Internationally. The switches are the network nodes and these are called signaling points (SP). These signaling point control the signals across a network. The direct the flow of electrical energy.

In telecommunications the flow of electricity over these connections of signal points or network nodes allow a network to have life.[261] Signaling according to Dryburg,(2005) is a network's nervous system that breathes life into the infrastructure.[262] Without this [life energy] from switches, networks will be lifeless and unproductive. It is this life that signals give that make networks living, linked wholes that are useful.[263]

In the USA, switches are known as exchanges, Central office(CO) or End Office (EO). Currently, network signaling is known as inter-switch signaling, network to network signaling or trunk signaling. The purpose of network signaling is to make connection and set up a circuit or path between the caller and the called so that a user traffic can be transported in both directions across a trunk.[264] It is the trunks (medium) that carry traffic between "telephony" (telecommunications) switching nodes. Most trunks in use today are digital. Digital trunks are either 4 wire pair (T1) or fiber optic mediums for higher capacity.[265] T1 lines have 24 multiplexed channels and are capable of

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[261] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 6, Cisco Press, 2005.
[262] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p6, Cisco Press, 2005.
[263] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p6, Cisco Press, 2005.
[264] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p6, Cisco Press, 2005.
[265] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p92, Cisco Press, 2005.

transmitting at 1.54 Mbps[266] while fiber optics lines are designated in Optical Carrier units and can transmit from OC-1 level (T3), OC-3 (3 times OC-1) to OC(192). An OC-1 line which transmits at 51.8 Mbps can carry 672 voice channels.[267]

The Central Office houses the digital switching equipment.[268] In the CO, manual switch boards were by replaced electro-magnetic switches and these were in turn replaced by software controlled electronic switches. At a typical CO, there is:

A) The Main Distribution Frame MDF – the connection point of external devices to the CO.

B) [269] The Digital switch that provides the actual connection between 'users' or end-points. 1) It has the trunk and line interface cards. The cards are usually in a peripheral device that a central processing unit controls. 2) It monitors information from other peripheral devices and does the actual call setup and devices. 3) It is used to perform billing and statistical information gathering functions for operations management. 4) It performs call processing, maintenance, diagnostic and fault recovery. The Operations Management logic is used to tally how long specific resources are used. This feature is widely used in VoIP installations where it measures how long calls last, as well as the path the call used from source to destination.

C) Switching matrix – multiplexes data and voice streams from one channel and inserts them into data and voice streams from another channel for facility to facility connection.

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[266] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p95, Cisco Press, 2005.
[267] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p94, Cisco Press, 2005.
[268] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p97, Cisco Press, 2005.
[269] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p98, Cisco Press, 2005.

D)[270] The Call Processing Unit that does call processing – This is the setup, maintenance and release of calls within the digital switch. Call processing involves call start, routing, connection and disconnection.

In actuality then, the CO with its digital switching equipment houses the intelligence of the network. With intelligent distributed nodes and network elements that are now available to service providers, the functions of the CO and its technologies are now made available in smaller compact modules as Intelligent Network Elements. This compacting allows network architectures to move from centralized modes to distributed ones that utilizes an Intelligent Network (IN) architecture. According to Dryburgh(2005)[271], what the Intelligent Network IN architecture does is that it:

"…redistributes a portion of the call processing that is traditionally performed by telephony switches, to other network nodes."

Intelligent Networks

Dryburgh writes of IN networks[272]:

"A modern IN network consist of several components that work collectively to deliver services….It is important to note that IN has not replaced the PSTN rather, it has been overlaid into it. [The Service Switching Point] SSP represents that traditional [Public Switched Telecommunications Network] PSTN switching exchange, but the software has been enhanced to support IN processing. The [Service Control Point] SCP, Adjunct, and [Intelligent Peripheral] IP are all additional nodes that were added to support the IN architecture."

Figure 7 [273] shows a typical Intelligent Network(IN) Architecture. Appendix 4 gives another example the Network Elements of an IN Architecture.

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[270] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 98, Cisco Press, 2005.
[271] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 311, Cisco Press, 2005.
[272] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p331, Cisco Press, 2005.

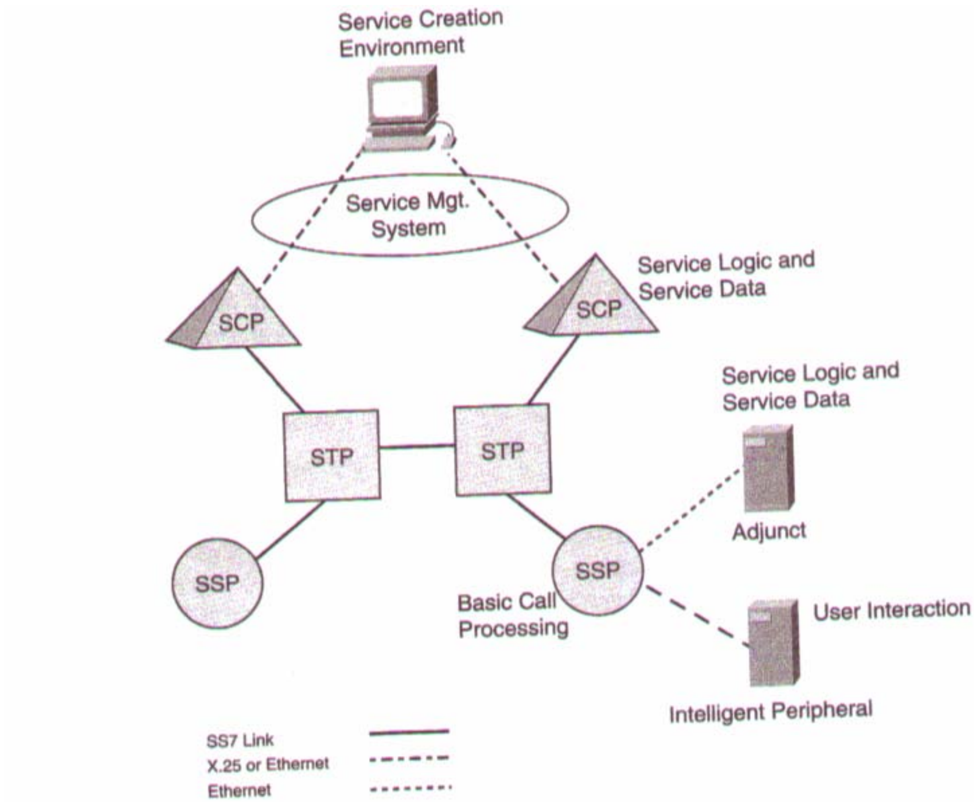

Figure 7 A Typical Intelligent Network(IN) Architecture

The discussion so far has looked at the basic technical components of a network and in this regards, protocol standards have been discussed. Then the discussion focused on the application programs that were shown to be the software codes that allowed the protocols to be processed. The discussion then moved on to the medium where it was showed how these facilitated the movement of information as energy. Essentially this energy is the electronic form of the information that is to be transmitted and the codes that allow this processing to occur. It is represented as coded information. The added codes direct the information as it makes its way from the sender to the receiver. This movement occurs on networks which are of two forms centralized PSTN or distributed digital networks. The discussion has also shown that the technology for PSTN is the

[273] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 328, Cisco Press, 2005.

same as that of distributed networks and that both types of networks depend on the intelligence of devices or nodes that are part of the network structure. In this section, a structure of the intelligent network will be looked at.

The open nature of networks and the seamless interconnection between different network types is based on the distribution of intelligence in the network. Each network has its intelligent components which enables it to interact with another. Cicso Systems one of the premier vendors of networking technologies notes that the distribution of intelligence in a telecommunications network started as a segmentation of responsibility. The aim was to move it [intelligence] to more open and diverse platform and away from the CO Settings. This brought with it, greater ability to have new solutions and new ways of connecting networks as well as greater network speeds and the faster creation of services. To implement distribution techniques in networks, they have noted that the following requirements are needed:

a) A high speed communication interface between participating computing platforms.

b) A protocol standard between services

c) Delegation of authority to perform tasks based on makeup of the service.

In Intelligent Networks (IN) the service logic is placed in application database servers or Service Creation Points (SCP) in different places along the network path. Given that Intelligent Networks are distributed networks, their origins are grounded in the OSI and TCP models and successful protocol agreement between disparate network elements are made possible through the use of protocol standards. Presently the technological innovations associated with Intelligent Networks allows them to offer lots of different user services with different entry points from which management functions are carried out. The distributed processing functions take the form of client/server and distributed objects architecture. The distributed objects (Network Elements) are the gateways, server and gatekeepers that operate in layers 4 to 7 of the OSI model. They are more concerned with the management and application provisioning of services. Figure 8 shows the layers of the OSI Model that gateways operate in.

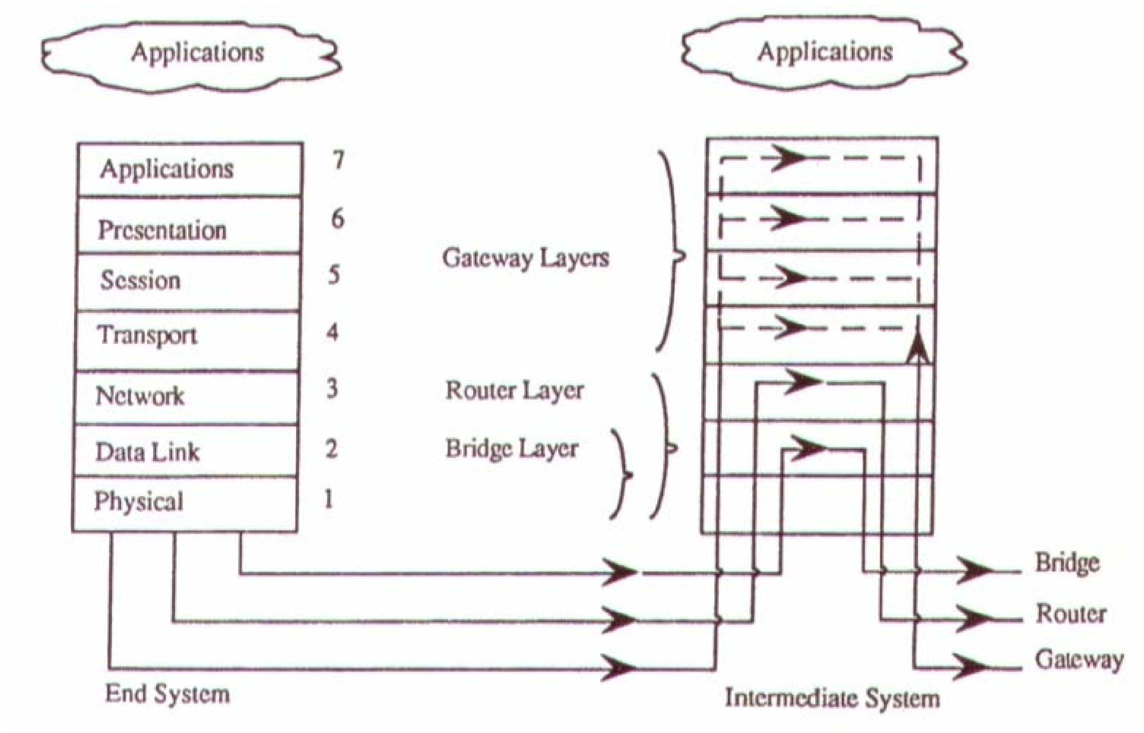

Figure 8 Gateway Layers in the OSI Model

In Internet telephony, it is this concept of Intelligent Networks that is used in the movement and management of voice over the Internet. The Intelligence that has moved from the Telephony CO and its switches are now available in the distributed intelligent network elements and devices that this new service uses. As briefly mentioned earlier, two such protocols that are used in the facilitation of VoIP are the SIP protocol and the H.323 protocol. These will be looked at again in later chapters. An example of the location of intelligent elements as used by these two different protocols are show in the following two figures.   The IN elements of SIP are shown in Figure 9 and the IN elements of H.323 are shown in Figure 10.

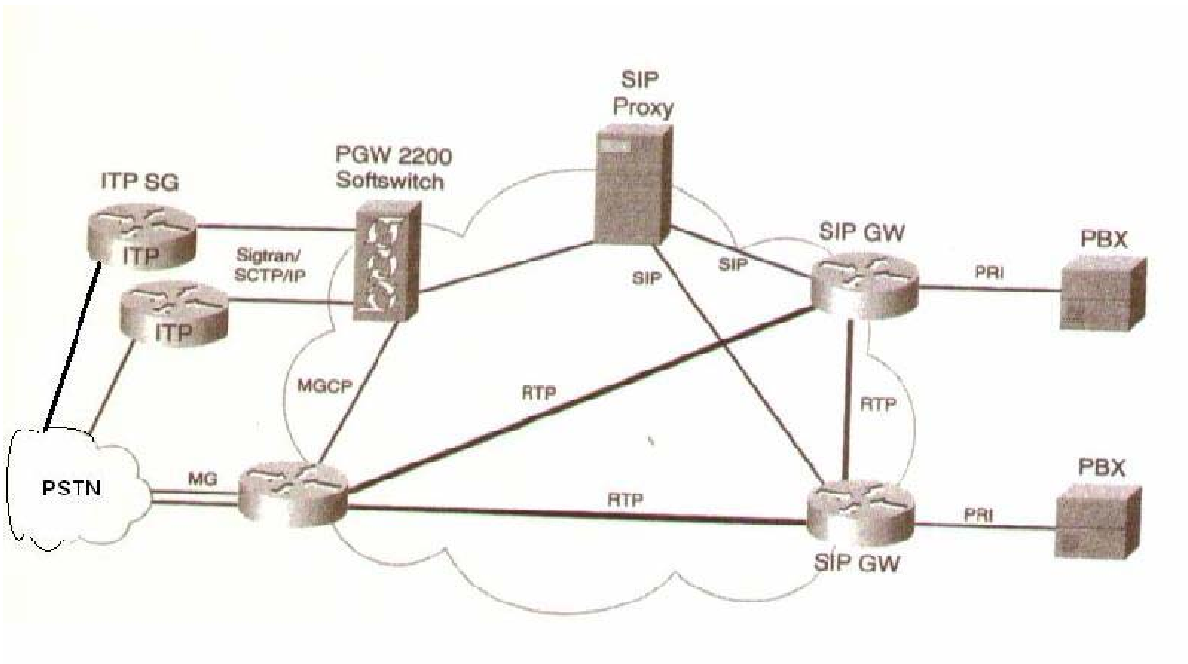

Figure 9 SIP Elements in an Intelligent Network

Source: Dryburgh

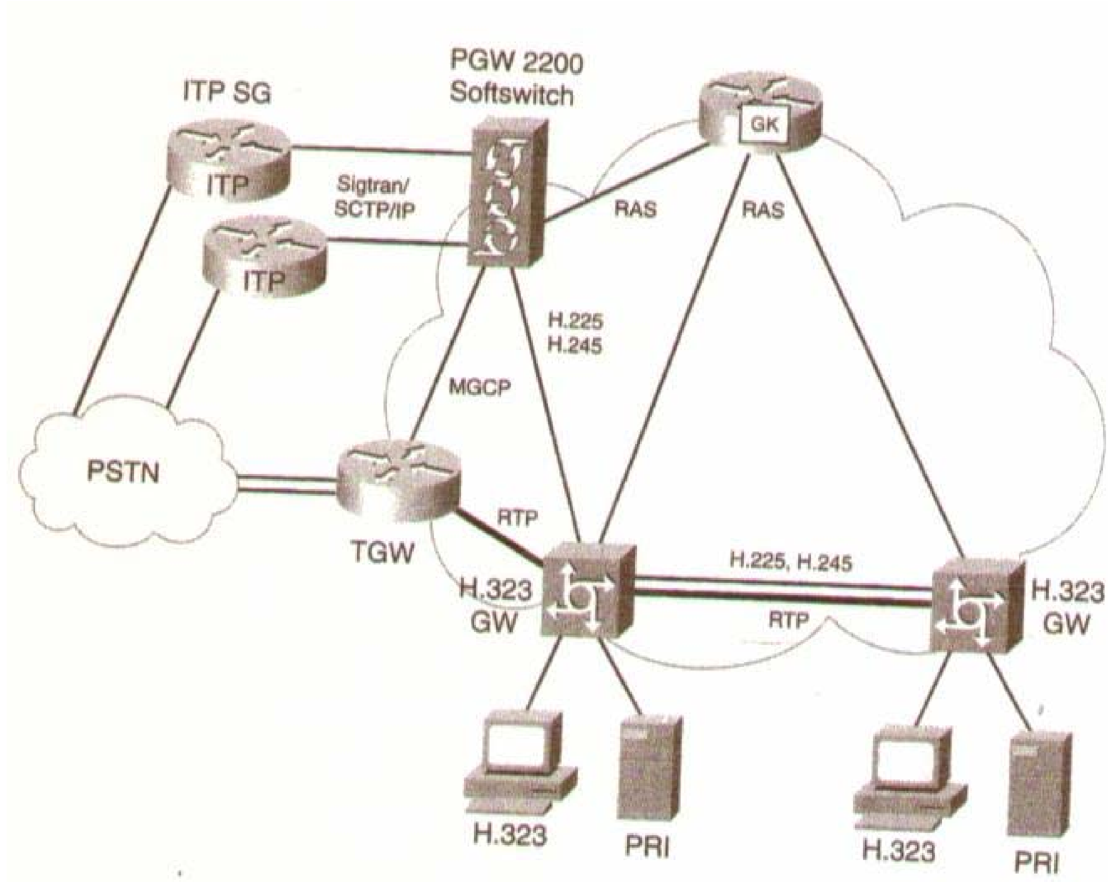

Figure 10 H.323 Elements in an Intelligent Network

As a prelude to explaining the specifics of the laws as it pertains to the policy formulations for the incumbent telephony operations as opposed to the new internet service operations, the intelligent elements in a network will be looked at a little bit more. The reason for this is to explain exactly from a technical perspective exactly what they are and references will be made to them in the discussions that involve the wording of the law. These explanations here will help to facilitate and make easier the technical discussions that will be made.

In light of this, explaining the role of IN elements in the network currently, can be made analogous to an example of a one bedroom house (a studio unit) is that is enlarged by adding on five new rooms. Rather than the one room efficiency mode of the original house, the house is now enlarged by adding on as an example in this scenario, a living room, kitchen, bedroom and bath and a dinning room.   The thing to remember is that the one room efficiency had all these sections. The question then is that has the functionality of the house changed? The answer is no. The different functions that were housed in one room is now made available in separate partitions but the main functional areas of sleeping, cooking entertaining and eating has not changed. So it is with telecommunications. Intelligence in the network has allowed the different functions that the PSTN provided in telecommunications services to now be replicated in customer sites and this has freed congestion at CO. The main activities are still that of the CO.   In distributed networking then, the new sites are similar to replicating the original house plan in the given example in other areas.

This is especially important in light of the co-location ruling that the FCC has given that requires space at COs for information service providers. Since the distributed capabilities of the intelligent devices which makes them ‘similar wholes’ to what is in the CO but which at the same time are independent, the devices can be located in sites that are remote to the CO while still enabling them to duplicate functions that being located in the COs would have fulfilled.

The thing here is that even though the different functions are now performed in distributed devices that are remote and separate the basic management and control functions of individual networks are still a factor of what capabilities a particular network is allowed to have as determined by the CO. This determines what the different servers and network devices of that network are allowed to see. As an example of this concept, take a limited Wide Area Network (WAN) of a university environment. Gateways connect the different departments and buildings to the University's centralized service management system. Different departments using their specific gateway devices are only allowed to see information of that portion of their network which pertains to them and this is what they have control over. The Central Office however can see all of the departments and hence the total network. It is the same with the CLECs. They are allowed a slice of the total network and this is what they see and manage. Without the 'slicing' of the pieces of intelligence in the network, the total network would still exist and these functions (enhanced services) could all originate from the CO as Telecommunications Services. What the partitioning does is that it makes others able to participate in providing these services as Information Services rather than having the CO or incumbent owners being the only one providing the services. It allows for competition.

In a nutshell what this shows is that information services are and can be looked at as slices or portions of telecommunications services in which the Network Elements used have been configured for a particular user population. This concept can be seen by looking at the SIP and H.323 models. Rather than the CO performing all its 'traditional' functions and thereby serving everyone, the different Sip servers and the H.323 gateways and gate keeper act as intelligent devices that "relieve" the CO of the management of these functions for certain user groups. The end result is that proliferation and growth is made possible as the economy moves from one in which there are workers for Incumbents to ones in which there are now Independent Service Providers as owners.

The Intelligence in the network servers, gateway computers, gate keeper components and other such devices which are used by one network to connect to and communicate with another allows for the smooth functioning of the sum of all networks. In a general , gateways which are also known as Network Service Access Points (NSAP) or Network Access Servers(NAS) allow the different networks whether they are Local, Wide, Metropolitan or enterprise to not only manage the information of a particular user group but also to connect with each other and the PSTN through a backbone or high speed connector. The backbone can be regarded in this context then as the aggregate of the medium that interconnects the different intelligent elements and the networks.

Backbone

In general, intelligent networks use super high speed medium as their connectors. Two such connectors or backbones are a super speed Ethernet backbone- Gigabit Ethernet and a Virtual Private Network backbone. It is the backbone architecture or medium over which these network devices run that forms the glue to not only LAN, Wide Area Networking but also to global network connectivity. Gigabit Ethernet and VPN both support wired and wireless Point to point connections between clients and hosts on a network

VPN

A Virtual Private Network (VPN) is a communications network that is usually of a private nature that is used by companies or groups of organizations and is a point to point network. VPN can be constructed over public networks such as the Internet using standard Internet protocols.[274]In secure mode VPNs, a cryptographic tunneling protocol which is a point to point connection between end users over public or other general IP networks is used.[275] Protocols used in secure VPN are Point to Point Tunneling Protocol (PPTP).[276] Another form of VPN is the Trusted VPN. In this mode, security for the VPN, tunneling is provided by a single provider's network.[277] VPN is also used when protocols other than IP are processed over a network or when several protocols are multiplexed into one link across a network.[278] Protocols used in tunneling are Layer Two Forwarding (L2F) from Cisco,[279] Layer Two Tunneling Protocol (L2TP)[280], Layer Three Tunneling Protocol (L3TP), Point to Point Protocol (PPP)[281], Multi Protocol Label Switching Layer -2 and -3 .[282]

Gigabit Ethernet

High speed Ethernet is used to form the backbone of large networks. It uses different technologies for implementing Ethernet networks. As a packet based technology it defines the wiring, and signals for the physical layer of the OSI Model[283] and it is a protocol defined by the IEEE 802.3 protocol stack. All systems in Gigabit Ethernet communicate with peers using unique a 48 bit key which is the MAC address.[284] It is this address which allows each node (computers or other networking devices) on the

[274] Wordiq.com, Virtual Private Networks, http://www.wordiq.com/Virtual_private network.
[275] Anders p210, Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, John Wiley and sons Ltd, 2003.
[276] Wordiq.com, Virtual Private Networks, http://www.wordiq.com/Virtual_private network.
[277] Wordiq.com, Virtual Private Networks, http://www.wordiq.com/Virtual_private network.
[278] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 210, John Wiley and sons Ltd, 2003.
[279] Mark Lewis Troubleshooting Virtual Private Networks, p11, Cisco Press, 2004.
[280] Mark Lewis Troubleshooting Virtual Private Networks, p135, Cisco Press, 2004.
[281] Mark Lewis Troubleshooting Virtual Private Networks, p215, Cisco Press, 2004.
[282] Mark Lewis Troubleshooting Virtual Private Networks, p421, Cisco Press, 2004.
[283] Wordiq.com, Ethernet, http://www.wordiq.com/definition/Ethernet.
[284] Wordiq.com, Ethernet, http://www.wordiq.com/definition/Ethernet.

network to have distinct addresses. It is a favorite architecture on school campus' [285] and an example of such an installation is that of Spokane Washington School District 81 which installed a Gigabit Ethernet back bone as a part of a WAN that connects the 53 schools of the district and the Administration District. The network uses IP telephony to satisfy the districts telephony needs and also supplies its Internet and data uses[286]. When OC192 Ethernet is used as a super fast backbone, the protocol and architecture of the network is known as Dense Wave length Division Multiplexing protocol (DWDM) architecture. This is the connector architecture or backbone of optical networks that connects high speed 10 Gigabit Ethernet WANS.[287] Another popular protocol and architecture used in the connecting of high speed WANs or MANs is Synchronous Optical Network- SONET.[288] This protocol is used in OC192 Ethernet backbones.

Physical Layout

The architecture for 802.3z Gigabit Ethernet is identical to the Ethernet 802.3 family from the data link layer upward. This allows compatibility among other Ethernet platforms by maintaining the IEEE 802.3 format.[289] To get this effect, two technologies were merged. The two technologies are IEE802.3 (Ethernet) and ANSI X3T11 (Fiber

[285] George Sackett Cisco Router Handbook, p121, McGraw- Hill, 2000.
[286] Tdmiop.com, School District Replaces VoIP with TDMoIP, http://www.tdmiop.com/Artoc;e/0,6583,1985,1,00.htm.
[287] Cisco Systems, Figure 7, 10 Gbe Port Types, http://www.cisco.com/en/US/tech/tk214/technologies_white_paper09186a0080092958.shtml.
[288] Cisco Systems, Figure 7, 10 Gbe Port Types, http://www.cisco.com/en/US/tech/tk389/tk214/technologies_white_paper09186a0080092958.shtml.
[289] Cisco Systems, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/en/US/tech/tk389/tk214/tech_brief09186a0080091a8a.html.

Channel) to give Gigabit Ethernet IEEE802.3z. [290] The end result is that the upper layers of IEEE 802.3z correspond to the Network Layer of the OSI model and the Logical Link Layer (LLC) of IEEE 802.3z correspond the Data Link Layer of the OSI model. This is shown in Figure 11.

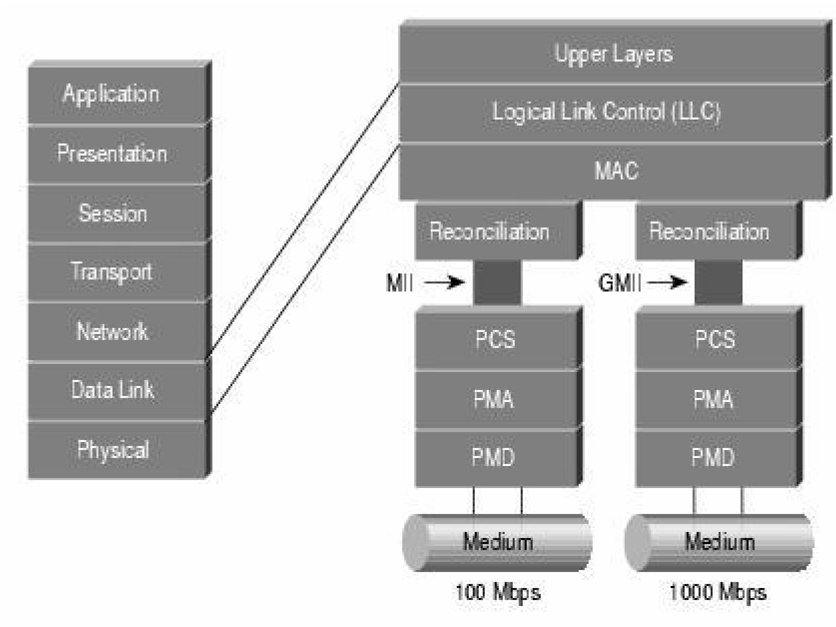

Figure 11 Corresponding 802.3 Layers to the OSI Model

Figure 12 shows the physical layout of 802.3z and how this group of protocols compares with 802.3ab the unshielded twisted pair cable. Gigabit Ethernet supports two types of fiber optics media which are short wave laser (SX) and long wave laser(LX) as well as shielded copper cable (CX). [291] Fiber optics mode comes in three types. Multimode(62.5 um) multimode (50 um) and single mode. [292] The type of Shielded pair that is used is shielded 150 ohm copper cable.[293]

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[290] Cisco, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/en/US/tech/tk389/tk214/tech_brief09186a0080091a8a.html.
[291] Cisco, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/en/US/tech/tk389/tk214/tech_brief09186a0080091a8a.html.
[292] Cisco, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/en/US/tech/tk389/tk214/tech_brief09186a0080091a8a.html.
[293] Cisco, Technology Brief, Introduction to Gigabit Ethernet, http://www.cisco.com/en/US/tech/tk389/tk214/tech_brief09186a0080091a8a.html.

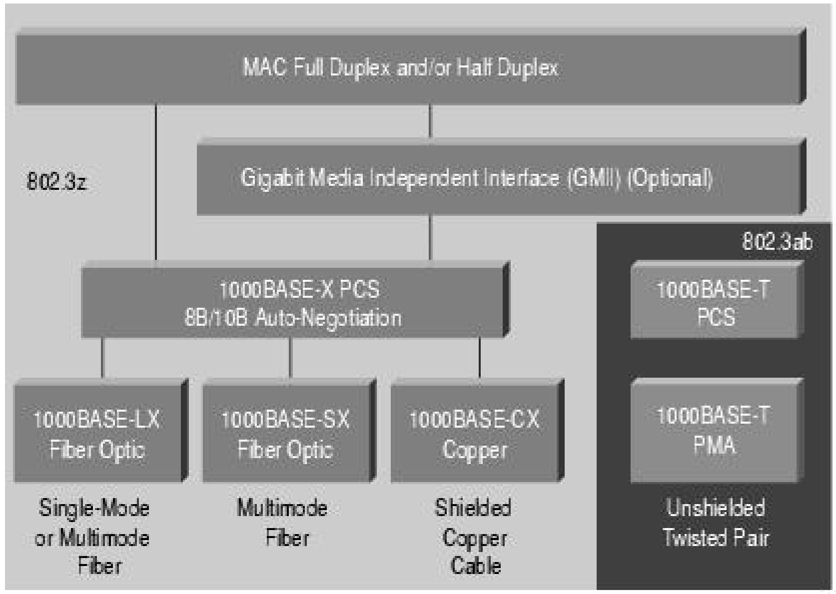

Figure 12 Physical Layout of 802.3z and 802.3 ab

Source: Cisco

Intelligent Networks Elements

After discussing all the basic parts that go to form an Intelligent Network, this section will look at the Intelligent Network Elements. In the USA, AT& T (Now AT&T/SBC) developed one such Intelligent Network (IN) architecture for the USA telephony market called A-I_Net which complements the Services of Advanced Intelligent Networks (AIN). The A-I-Net network is supposed to integrate with the Advanced Intelligent Network (AIN) of the Local Exchange Carriers (LECs) that are clients of AT&T.[294] What the A-I Net does is that it allows AT&T to provide to their customers fast paced, new and customized features as soon as they are developed, as well as allows for fast

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[294] E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 104, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

modification of existing services.[295] A-I Net and AIN are flexible in that they allows for the distribution of and control of intelligence in the network. AIN 0 the first of this networks, has been replaced by AIN 0.1, and subsequently by AIN 0.2[296] This concept is gaining popularity and the ITU-T has adopted it and has developed a similar network architecture the Intelligent Capability Set-1 (INCS-1)[297] and IN CS-2.

Intelligent networks, using intelligent devices or nodes, process the initiation of a call from the start of a call by one party to the termination of that call. Routers, server, gatekeepers and gateway elements serve as the devices or nodes which handle the call processes on the network.[298] Dryburgh (2005), notes that:

" The Intelligent Network (IN) is an architecture that redistributes a portion of the call processing, that is traditionally performed by telephony switches , to other network nodes." In Intelligent Networks (IN), the work, of dealing with a call is handled through Network Elements (NE). Intelligent Network are made of devices such as:

the Service Switching Points (SSP) which is usually a cable modem or PBX ; a Service Control Point (SCP) which acts as a gatekeeper; a Service Circuit Node(SCN) which acts as a gateway; Service Creation Environments (SCE) which creates service Logic Programs; Service Management Systems(SMS) which co-ordinates the sharing of data; the Network Access Point (NAP) which detects signals in the network; the Operations Support System (OSS) which acts as the traffic controller; Service Provision Point which

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[295] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 104, John Wiley and sons Ltd, 2003.

[296] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 311, Cisco Press, 2005.

[297] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 317, Cisco Press, 2005.

[298] Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 362, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

contains commercial information about subscribers; an Intelligent Peripheral which provides add-ons to the other services; and the Adjunct Processors which co-ordinates the space that the programs work in. A detailed list of these different Intelligent Network Elements and the processes they perform are given in Appendix 5. Appendix 6 [299] shows the IN physical Plane and the Distributed Functional Planes combined.

The network elements which have been identified in Appendix 5, can be further classified into their which specify the manner in which the systems functions should be carried out. It is these units that are used in formulating the modules of the intelligent network element (- the unbundled network elements or devices). The modules in turn define or give the functions that these devices can perform. These functional units are listed as follows:

Functional Entities in the Intelligent Functional Architecture

Call Control Function

- Gives call control in real time during the effecting of a particular service

Service Control Function

- Control Call Control Functions while a service is in progress
- It is managed by the Services Management System

Service Management Function

- Causes the service related data to get updated.
- Causes the deployment of services

Service Creation Environment Functions

- Causes the testing of services after it has been defined and developed
- Causes developed functions to be loaded into the SMS

Specialized Resource Function

- Causes definition of announcements and other specialized functions.

[299] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p332, Cisco Press, 2005.

CHAPTER 12

VOIP INTRODUCTION

So far, I have looked at the distinct individual sections of a network to give the reader an idea of what the different parts are. In this section, I will start to bring together the different parts so that as to show how they all interconnect.

From the protocol discussion, I illustrated the structure that is used to move information from one place to the other. These protocols are actually the programmed software codes and these were discussed in software applications. Then the discussion moved unto discussion of the medium, their types and how these functions and from this to intelligent networks. In the discussion of Intelligent networks, I briefly discussed the devices that these networks use and the devices such as the gateways and gatekeeper devices that facilitate movement by initiating and then moving information across areas. I also discussed the modules in these network elements and what they did. These modules such as the SSP, SCP, are blocks of computer programs generally referred to as **A**pplication **P**rogram **I**nterface (API) or Middleware. In this chapter, I will look briefly at the APIs in relationship to the medium and client applications as well as relate this to two VoIP applications SIP and H.323.

Application Program Interface (API)

In a network, the network element functions are performed by the Application Program Interfaces and Middleware elements and they are located in the Network Elements or devices or nodes. Stacked up, they provide the software modules of the different services that make up applications. In groups or as service modules, they function as to the specifics of particular protocols. Essentially, they are the intelligence in the network. An Application Program Interface can be described as follows : “An Application Program

Interface (API) is the specific method prescribed by a computer operating system or by an application program by which a programmer writing an application program can make requests of the operating system or another application."[300] Another description describes it as " A set of rules for writing functions or subroutine calls that access functions in a library. Programs that use these rules or functions in their API calls can communicate with others that use the API, regardless of the others' specifics."[301]

Also, an API is a type of Middleware, and it is , "… an important feature when developing new or upgrading existing distributed systems…. [They] are a set of distributed software that exist between the application, the operating system and network services on a system node in the network."[302] Networking procedures and applications services rely on both the APIs and Middleware software for the nodes and devices to function. At their basic core, APIs and Middleware are the Service Program Logic Programs (SLP) and they contain the runtime call processing flows as well as other message flow information.[303] Carnegie Mellon Software Engineering Institute[304] has identified three classes of Middleware which are:

1) Distributed system services – This allows program to program communications

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[300] SearchWin2000.com, Application Program Interface, http://searchwin2000.techtarget.com/sDefinition/0,,sid1_gci213778,000.html.
[301] Carneige Mellon Software Engineering Institute, Application Programming Interface, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/api.html.
[302] Carneige Mellon Software Engineering I Carneige Mellon Software Engineering Institute, Application Programming Interface, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/api.html institute, Application Programming Interface, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/api.html.
[303] Peter O'Reilly, Russel Sivey, GTE's Intelligent Network Test bed, p 125, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, IOS Press 1992.
[304] Carneige Mellon Software Engineering Institute, Application Programming Interface, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/middleware.html#179724.

2) Application enabling services which give applications access to distributed services and the underlying network

3) Middleware management services which allow applications and systems functions to be continuously monitored.

Carnegie Mellon Software Engineering Institute defines a Middleware as : "… Connectivity software that consist of a set of enabling services that allow multiple processes running on one or more machines to interact across a network. Middleware is essential to migrating mainframe applications to client/sever applications and to providing for communications across heterogeneous platforms. This technology provide[s] for interoperability in support of the move to client/server architectures."[305]

The state of the computing industry is such that currently many are partnering up to find methods of making and sharing software codes that are used in networks and other applications standardized not only as they relate to the protocols they follow but also according to the actual computer codes that are used. One such is the Distributed Computing Environment (DCE), under the auspices of the Open System Foundation (OSF) is a set of integrated system services that has as its primary goal getting the different parts of different networks to connect seamless using similar codes and code structure .[306] Appendix 7 lists some of these projects that are currently going on while Figure 13 shows the location of software modules - API and Middle Ware in the network

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305 Carneige Mellon Software Engineering Institute, Middleware, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/middleware.html#179724.

306 Carneige Mellon Software Engineering Institute, Application Programming Interface, Software Technology Roadmap, http://www.sei.cmu.edu/str/descriptions/dce.html.

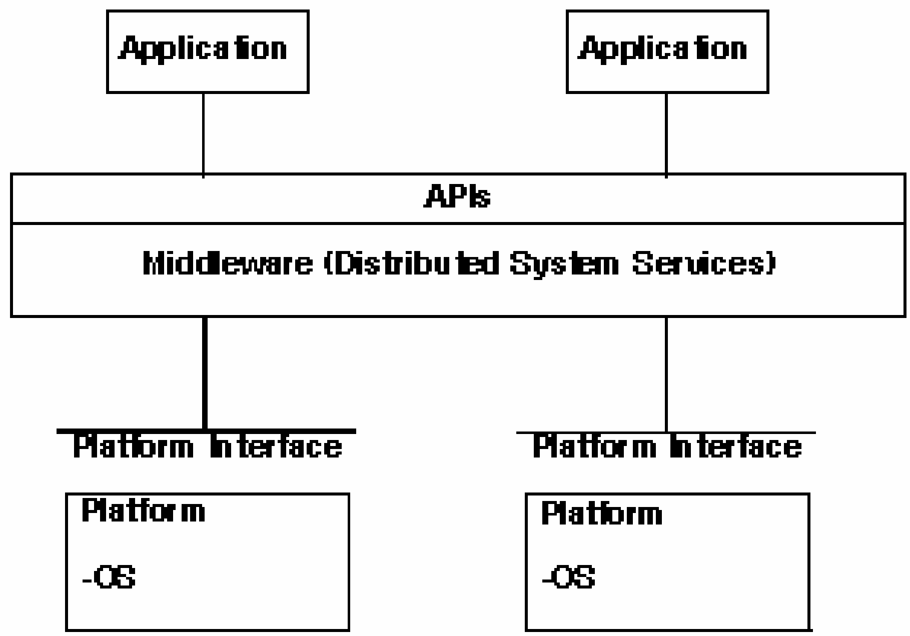

Figure 13 Location of API and Middleware Modules in the Network

Source: Carneige Mellon

In relations to the OSI model, APIs reside in Layers 4, 5 , 6 and 7 while middleware reside in Layers 1, 2 and 3. These make up the intelligence in the network. More importantly, what this discussion so far has really tried to make clear is that intelligence in the network lies in the modules of programs. I have for ease of discussion in this paper used two major classifications of a network which are the medium and the application programs. The medium and the application programs are structured according to protocols which tell what functions are to be performed. Actually doing the functions are the program codes. The program codes tell how the functions get carried out and they have the same basic routines regardless of whether they operate from a Layer 1 module or a Layer 7 module. Essentially then what the discussion has built up to is the fact that intelligence occurs in the total network not in just one part. This intelligence directs and controls the protocols of the lower layers and hence the business of the medium while in the middle and upper layers it directs and controls the associated protocols and hence the application that is used as well as the information that is transferred.

Conceptualizing this pictorially are Figures14 and Figure 15 Accelero systems diagram[307] that depict the core service applications which is referred to as In Protocol APIs running under Customer Applications but over Media Program Modules. Figure 14 shows this concept for the In Protocol API while Figure 15 shows the same concept but in a wireless mode. These are flanked by the interaction capabilities to these modules – the XML text editing features by which the codes are accessed and the Operations and Management features that provide statistical and other database functions. Again it is important to note here that primarily the structure is the same for both wired and wireless applications.

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[307] Accelero, Enabling Application vision Wireless, IP and In Applications Development Software, http://www.intellinet-tech.com/Downloads/IntelliNet_Accelero_ADS.pdf

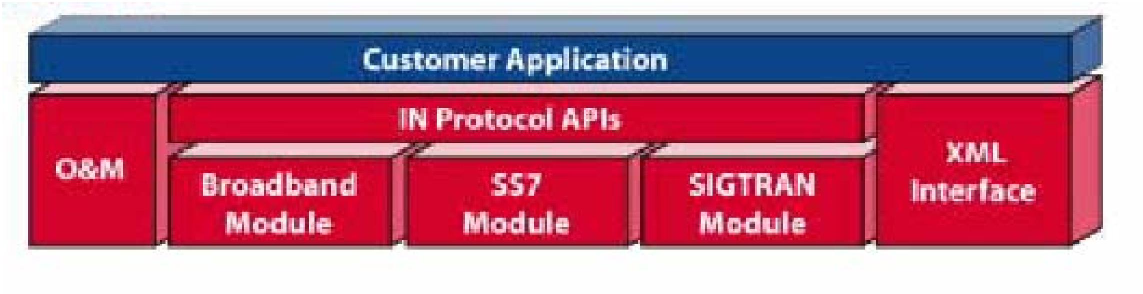

Figure14 IN Protocol API

Source: Accelero.com

Figure 15 API Protocols in a Wireless Mode

Source: Accelero.com

VoIP Overview

From this general discussion of Intelligent Networks this concept will be looked at in some detail using the application program or service VoIP. These will form the basis from which the legal arguments will be made later in the study. These technical discussions will be used to show the inconsistencies that exist in the ruling that the FCC and Congress has made in how Telecommunications Services are regulated as opposed to Information Services even though as has been showed, the processes involved in their operations are technically the same.   This discussion will use the VoIP service which functions and uses the same network elements as those used in PSTNs.   The technical description of the similarity between the PSTN telephony service and the Information Service classified VoIP is discussed in this chapter.

In VoIP, Service Switching Points (SSPSs) which are telephone switches are connected in a packet network (E.g. Gigabit Ethernet) to Service Control Points (SCP). SCPs are normally general purpose computers that are used as gatekeeper to form an Intelligent Network.[308] Essentially what is of importance is the interpretation, decoding and conversion of information from the signals that are produced by the Internet telephony signals as against those that are produced and used by Traditional IN PSTN environments. [309] These "Intelligent services" are performed by the Network Elements within the context of a call, i.e., during call setup, call teardown, or in the middle of a call.[310] Two such VoIP services that use these processes are H.323 and SIP and these will be looked at briefly. These functions are performed by the Intelligent gateway element in SIP and gatekeeper elements in H.323.

H.323 is a "umbrella Protocol that defines the protocols stack that allows audio- visual communications sessions to take place on packet networks in real time. [311] H.323 is one protocol among many such as Session Initiation Protocol (SIP –IETF RFC 3261[312]), Media Gateway Control Protocol (MGCP H.248[313]), MEGACO IETF RFC 2885 or ITU

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[308] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com.
[309] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com.
[310] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, 3.1 The Concept of State in SIP, http:/rfc3976.x42.com.
[311] Wordiq.com, Definition of H.323, http://www.wordiq.com/definition.H.323
[312] Wordiq.com, Definition of Session initiation Protocol, http://www.wordiq.com/definition/Session_Initiation_Protocol.
[313] Cisco Systems, Understanding Packet Voice Protocols, http://www.iec.orWg/online/tutorials/packet_voice/topic02.html.

recommendation H.248[314], TDM/SS7 [315] which are used to provide real time communications services over Internet Protocol known as VoIP.[316] Other protocols include Skinny Client Control Protocol (SCCP),[317] Real Time Transport Protocol (RTP) which is also know a IETF RFC 1889[318]. H.323 is currently implemented in applications such as Voxilla (Linux), Net meeting ,[319] and Cisco's Multimedia Conference Manager (Cisco MCM).[320] H.323, SIP as well as MGCP/H.248/MEGACO comparisons is given in Table 5.[321]

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314 Cisco Systems, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic02.html.

315 Att.com, Common VoIP Architecture, http://www.business.att.com/emea/english/services/pdf/voip_architecture.pdf.

316 ATT.com, Common VoIP Architecture,http://www.att.com/emea/English/services/pdf/voip_architecture.pdf.

317 Cisco Systems, Understanding IP Telephony Protocols, http://www.cisco.com/en/US/products/sw/voicessw/ps556/products_administration_

318 International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic02.html.

319Wordiq.com, http://wordiq.com/definition/H.323.

320 Sam Kotha, Cisco Systems Inc, White Paper, Deploying H.323 Applications, in Cisco Networks, http://www.cisco.com/warp/public/cc/pd/isoc/ioft/mmcm/tec/h323_wp.htm.

321International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic02.html.

Table 5

Comparison of VoIP products

	H.323	**SIP**	**MGCP/H.248/MEGACO**
Standards Body	ITU	IETF	MGCP/MEGACO—IETF;H.248—ITU
Architecture	Distributed	Distributed	Centralized
Current Version	H.323v4	RFC2543-bis07	MGCP 1.0, Megaco, H.248
Call control	Gatekeeper	Proxy/Redirect Server	Call agent/media gateway controller
Endpoints	Gateway, terminal	User agent	Media gateway
Signaling Transport	Transmission Control Protocol (TCP) or User Datagram Protocol (UDP)	TCP or UDP	MGCP—UDP;Megaco/H.248—both
Multimedia capable	Yes	Yes	Yes
DTMF–relay transport	H.245 (signaling) or RFC 2833 (media)	RFC 2833 (media) or INFO (signaling)	Signaling or RFC 2833 (media)
Fax–relay transport	T.38	T.38	T.38
Supplemental services	Provided by endpoints or call control	Provided by endpoints or call control	Provided by call agent

SIP Network

The SIP network is made up of end points, a proxy and/ or redirect server, location servers, and a registrar. These house the network elements which are the user agent clients and servers, stateless and state-ful proxy servers and the registrars. In the use of SIP, the user initially reports their location to a registrar, which may be integrated into a proxy or redirect server. This information is in turn stored in the external location servers on the network.[322] All these different functions constitute the SIP application which in turn allows VoIP communications to take place.

SIP Application

SIP is an applications layer protocol that works together with other multimedia session data such as voice, video and text by allowing Internet endpoints which are known as user agents to find one another and agree on the particulars of a session they would be sharing.[323] Although SIP is often as listed an applications layer protocol in actuality in the OSI model, its location is between Layer 5 and Layer 7. SIP allows for VoIP communication by facilitating the creation and management of sessions. A session is the exchange of data between participants and in this regard, SIP is also a signaling protocol.[324] In a peer to peer SIP network, there are no fixed clients and servers but peer nodes which function as both clients and servers to other nodes in the network.[325]

The SIP Protocol is a text based HTTP styled protocol that handles all types of conversation[326] and it works together with another embedded protocol the Session

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322 Washington Internet Project, Voice over IP(Internet Telephony), 5.1 Sip Architecture, http://www.cybertelecom.org/voip/Index.htm.

323 Faqs.org, RFC 3261 (RFC3261), Internet RFC/STD/FYI/FCP/Archives, RFC 3261 – SIP Session Initiation Protocol, 1 Introduction, http://www.faqs.org/rfcs/rfc3261.html

324 Anders Olsson, Understanding Changing Telecommunications, building a successful telecoms business, John Wiley and Sons, LTD. P 268.

325 Wordiq.com, Peer-to-Peer, http://www.wordiq.com/definition/Peer-to-peer.

326

Description Protocol (SDP) which describes the characteristic of the media in moving information across the Internet. In SIP networks, the gate keeper device provides the address resolution.[327] Sip has two proxy parts which are namely a user agent, and a server agent. The client portion is called the User Agent Client (UAC), and the Sever portion is called the User Agent Server (UAS). The UAC is the SIP functional entity or network element that initiates SIP requests and the UAS receives and returns responses on behalf of the User. The UAS is also the network element or functional entity that terminates a request.

There are 3 types of servers [328] that SIP uses. These are 1) A registration server – This gets information concerning the current location of the user. 2) A proxy server receives request which is forwarded to the next-hop server. The proxy server can acts as the UAS as well as a UAC.[329] Further more in a network, there can be in addition to the main Proxy Server, i) An Outbound Proxy Server whose function is to receive all outgoing requests from a particular UAC. ii) A Back to Back User Agent (B2BUA) which acts as a User Agent Server and processes requests also.[330] 3) Redirect server which find the location of the next-hop server, and gives this information to the client.

In Sip, Callers and Callees are recognized by a SIP URL. This is given by the form sip:username@host. Calls in SIP are made by sending a request to a SIP proxy server or directly to a host. After resolution to a SIP server, the client sends the request to that

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[327] Washington Internet Project, Voice over IP (Internet Telephony), 2.2Overview of VOIP Data Handling, http://www.cybertelecom.org/voip/Index.htm.
[328] Rakesh Arora, Voice over IP: Protocols and Standards, http://www.cse.ohio-state.edu/~jain/cis/788-99/ftp/voiop_protocols/index.html.
[329] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, 4.1 The SIN Architecture, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com
[330] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com.

server. In SIP, invitations are given to join servers by and INVITE followed by a ACK. The INVITE allows the called to join a particular conference or two party conversation. After the callee joins in the call, the invite request contains a session description that provides the called party with pertinent information. Although the called may change its position with time, the locations are dynamically registered with the SIP server the SIP server if queried about the location of the called can give a list of possible locations. A detailed description of the SIP Server's functions and the associated modules that it contains are given in Appendix 8. Figure 16 identifies a general architecture that depicts a general SIP Intelligent Network (SIN) Architecture.

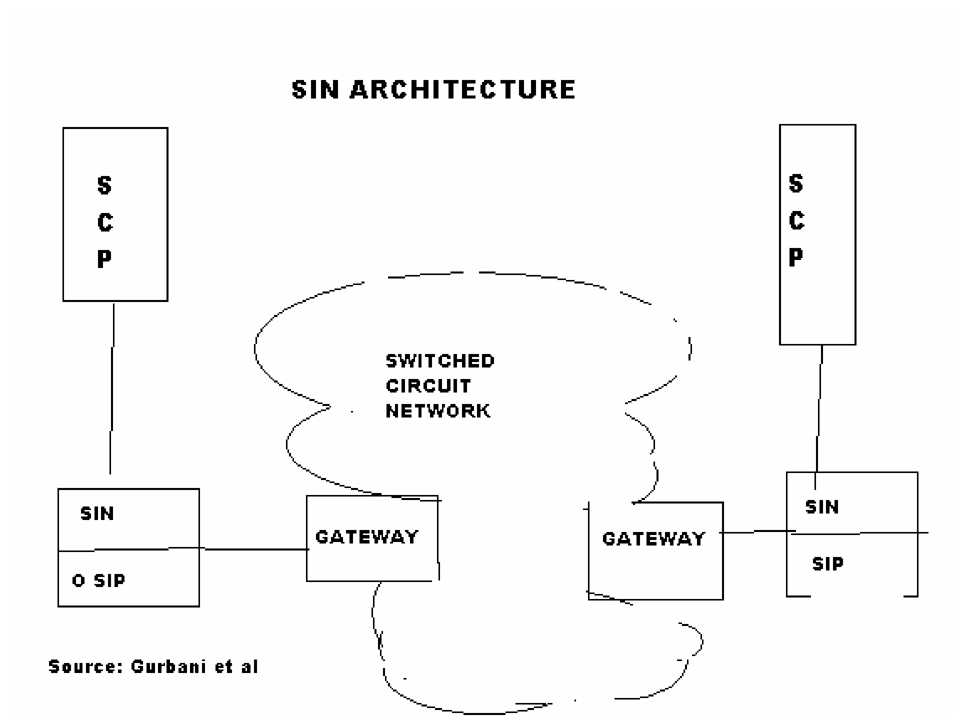

Figure 16 SIP/SIN Architecture

H.323 Network

In H.323, the Gate keeper node is directly equivalent to and performs the functions of a traditional PSTN switch. The equivalent of this in SIP is the User Agents and in Megaco, it is the Media Gateway Controller. "An H.323 network is made up of several endpoints (terminals), a gateway, and possibly a gatekeeper, a Multipoint Control Unit, and a Back End service. The gateway is often of the main components in H.323 systems and it serves an address resolution and bandwidth control purposes as well as acts as a bridge between the H.323 network and other SIP networks or traditional PSTN networks.[331]

Cisco one of the leaders in networking technologies writes:

"For true end-to-end multimedia application support, a network infrastructure must have the following characteristics:
".. Standards compliance – Successful mass deployment of networked multimedia applications will span the globe via multiple carrier backbone(Private LAN/WAN networks and the Internet) and travel through many devices made by several vendors. H.323 enables vendors to follow the same guidelines for developing equipment, network software and application software, to ease or eliminate the incompatibility problems encountered in today's multivendor networks including the Internet."[332]

Another characteristic that H.323 has as an end- end- point networks is that it allows for Multimedia Protocol support which ensures the proper transmission of audio, video and data across different and 'multiple' network environments. It also has the ability to convert between protocols and that conversion takes place at boundary devices. Boundary devices include such devices as Gatekeepers, Boundary Elements, Gateways, Multipoint Control Units, LAN servers and PBXs.[333]

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[331] Washington Internet Project, Voice over IP(Internet Telephony), 4.1 H.323 Architecture, http://www.cybertelecom.org/voip/Index.htm.

[332] Sam, Kotha, Cisco Systems, Inc, White Paper, Deploying H.323 Applications, in Cisco Networks, http://www.cisco.com/warp/public/cc/pd/isoc/ioft/mmcm/tec/h323_wp.htm.

[333] Sam, Kotha, Cisco Systems, Inc, White Paper, Deploying H.323 Applications, in Cisco Networks, http://www.cisco.com/warp/public/cc/pd/isoc/ioft/mmcm/tec/h323_wp.htm.

H.323 Application

H.323 allows easy connections to legacy voice networks such as PSTN and Signaling System 7.[334] It uses a distributed architecture so companies can have large scale networks which have redundancy built in as a backup and is at the same time scalable. It is an 'Umbrella Protocol" because it defines all aspects of the call transmission from call start to capabilities exchange to network resources availability.[335] H.323 defines RAS protocol- this is used for call routing. It also defines H.225 protocol for call set -up[336] and H.245 for capability exchange. It supports intelligence in the network in either the gatekeepers or the gateways.[337] It uses ISDN Technology in the transfer of information across the medium. The Network Elements of H.323 and their functions are given in Appendix 9

In the brief background that I have outlined above, I have showed how VoIP which has been classified as a Information Services functions in the same manner as Telephony Services . The thing that is of importance though is that PSTNs are now digital in structure. I will use computer network elements and their relationship to network processes and VoIP, and incumbent telephony service production to show in the next section where inconsistencies in the law may currently exist and I will look at these elements and services from the perspective of the FCC, Congress and Court rulings.

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334 International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic.html.
335 International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic.html.
336 International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic.html.
337 International Engineering Consortium, Understanding Packet Voice Protocols, http://www.iec.org/online/tutorials/packet_voice/topic.html.

CHAPTER 13

BASIC AND ENHANCED SERVICES ARE THE SAME

Protocol Neutrality Make Basic and Enhanced Services the same

First, I will try to illustrate that the neutrality of protocols makes basic and essentially enhanced services the same as they relate to telephony and Internet related services provision. Basic to this discussion is what I had discussed from a technical point in the preceding chapters. Then in the next chapter, I will do the same thing and show that Telecommunications and Information Services are also essentially the same. The basic discussion in this section will center around the Computer I,II III orders and the Protocol Order of 1983.

Categorizing Functions – The Case of Structural Adjustments

In the regulation of telecommunications in the USA at the turn of the Twenty First Century, rulings moved away from regulating only the media that the telecommunications devices use and which was in essence what telecommunications actually was all about, to regulating aspects of the intelligence that is only part of the total network. The movement towards regulating the intelligence and intelligent devices of networks was an attempt to find a better way of regulating matters pertaining to telephony given the growth in the industry. The FCC wrote in its Computer Inquiry III of 1986 wrote about Computer Inquiry I:

"The regulatory issues spawned by the technical confluence of regulated communications services and unregulated data processing services have been among the most important this commission has dealt with over the past 20 years. Indeed, during this period, we have addressed these issues in one proceeding or another, on a virtually continuous basis, as we have sought to revise and refine our regulatory approach in light of rapidly changing technological and market place developments." [338] "…We regulated "communications" as common carrier offerings under Title II of the Communication Act.

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[338] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (A)(9) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3 , p 9, By the Editors of Telephone News 1986.

“Hybrid” services, which we defined as offerings that combine “[r]emote [a]ccess data processing and message –switching to form a single integrated service were to be treated as either data processing or communications services based on commission determination as to which of the two functions was predominant in the particular hybrid service.[339]

At this time, the FCC also allowed other common carriers other than AT& T and its Bell subsidiaries to provide data processing services subject to a structural separation requirement. After the implementation of Computer I there were problems with actually giving a definition to the hybrid category. This was because the changes in technology and the needs of the consumers closely meshed together the offerings in the areas of communications and data processing. As such it was hard for the FCC and the service providers to make a determination as to what their predominant service was. As a result of this, the FCC tried to fix this in Computer II.

The FCC continued about Computer II as a background in Computer III:

“Accordingly we adopted a new regulatory definitional scheme with two service categories: basic and enhanced. We defined basic service as limited to “the common carrier offering of transmission of capacity for the movement of information.” Data processing computer memory or storage and switching techniques can be components of a basic service if they are used solely to facilitate the movement of information. We further determined to continue to regulate basic services under Title of the Act since such services are “wholly traditional common carrier activities.” [340]

A clarification of what enhanced services were is given as follows by the FCC as such:

“In the Final decision we described an enhanced service as “any offering over the telecommunications network which is more than a basic transmission service. We revised our Rules to define enhanced services by articulating those functions that we considered to be different from basic services. [T] he term “enhanced service” shall refer to services, offered over common carrier transmission facilities which employ computer processing applications that act on the format, content, code, protocol or similar aspects

[339] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (A)(9) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 9, By the Editors of Telephone News 1986.
[340] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (b)(10) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 10-11, By the Editors of Telephone News 1986.

of the subscriber's transmitted information; provide the subscriber additional, different or restructured information; or involve subscriber interaction with stored information. We also deregulated CPE. Accordingly to guard against such abuses, we required major carriers to provide enhanced services and CPE only through corporate affiliates fully separated from their basic services operations." [341]

In addition, the FCC noted that although it did expect a carrier to try to find loop holes in the laws, with the structural separation requirements, it was its hope that should these occur and result in abuses they would be easy to identify. The FCC gave the rationale for structural separation as follows:[342]

"Under structural separation, transactions between a business organization's basic services operation and its enhanced services and CPE operations would have to cross corporate boundaries and have to be recorded in separate books of account for regulated and unregulated affiliates."

Under Structural Separation AT& T was not allowed to provide basic services or to own any networks or local distribution transmission facilities. Its subsidiaries were prevented from offering an enhanced services or CPE although this was later changed.[343] At the time of the ruling though in Computer II, the FCC's findings were that enhanced services were to be unregulated because it was found to be competitive[344] and that the

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[341] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(11) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3 , p 11, By the Editors of Telephone News 1986.
[342] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(13) Deborah Eby, Linda M. Buckley, Barbara Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(11) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 11 By the Editors of Telephone News 1986.
H. Bink, Understanding Computer 3, p 12 By the Editors of Telephone News 1986
[343] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(14) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 14, By the Editors of Telephone News 1986.
[344] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(11) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 11 By the Editors of Telephone News 1986.

transmission component is a basic function while any Information retrieval is to be considered an enhanced component.[345]

The question that arises at this point is it is possible to separate transmission from information retrieval components in a meaningful way? Are there differences in the way that the programs and the protocols that these different services use that allow this to be possible? The FCC did not think this is the case. As a result of this, it tried to fix this inequity in the in computer III. Although it had proposed three alternative regulatory approaches for protocol processing in Computer III, the FCC concluded about protocol processing[346] in its Final Order, that none of them should be adopted and instead identified two ways in which either technical and market characteristics of protocol processing can lead to different regulatory treatment.

Of importance here is the fact that the FCC is saying first of all that the technical characteristics of a protocol can cause it to be considered different from another. This is then saying that based on the protocols that a service uses, that service can be differentiated from another. I have however shown in earlier discussions that protocols are simply routines or combined modules of programs that do different functions which are the services. Essentially it boils down to the routines or programs that a service uses. What the FCC is therefore saying from a technical perspective is that these can be used to differentiate one service from the other.

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[345] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (B)(15) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 11 By the Editors of Telephone News 1986.

[346] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, I Introduction (7) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 8, By the Editors of Telephone News 1986.

As explained earlier, services are the applications that are either used for management and control purposes or the end-user product. In the case of VoIP which is currently an enhanced service for example these are the end user to end user telephone calls and features and the different computing processes that make this up. In the case of common carrier telephony, these are the switching processes that were traditionally done by large switches in the Central Office of telephony providers.

These processes as shown earlier also are Program Routines. These Routines are the software program calls in modular packages and essentially they act in the same way for the provision of telephony services as well as for the provision of enhanced services. They make up the "processes that the network elements perform". The only thing that is different about these software routines is the functions that they perform. If two things are the same in everyway except for the functions that they perform is this grounds then for differentiation in this instance? Is functional differentiation a valid ground for division? The FCC did not think this is the case. As a result of this it amended its ruling and wrote in Computer Inquiry III:[347]

"Because of the close technical and functional relationships between protocol processing and basic communications, an approach under which protocol processing would be treated as a neutral "adjunct" service could be an appropriate regulatory response."

At this point, I will like to pause and look at the specifics of this ruling which asks the question - Can Protocol processing be neutral? Can services that provide and use protocol processing be differentiated on the basis of neutrality?

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[347] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, I Introduction (7) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 8, By the Editors of Telephone News 1986.

The FCC did think that this is the case and that Protocols can be neutral since at this time, they decided to treat services as either basic or enhanced based on its protocol. An explanation for this inconsistency may be due to the fact that protocols are what unregulated markets were using in differentiating the basic from enhanced services, the FCC did not want to encroach upon it and re-regulate it this early in the development of these technologies. This shows the kind of tight-rope role the FCC has to play in its regulatory efforts. In fact the FCC stated as such when it wrote:

"This approach would require that protocol processing be regulated in the same fashion as the underlying service – whether basic or enhanced –with which it is associated in a particular offering. However, as a pragmatic matter, we recognize that protocol processing functions are offered in competitive, unregulated markets, and we seek to avoid the potential for any unnecessary re-regulations in such markets[348] … before adopting any changes in this area, we defer to the Supplemental Notice any final action on the regulatory treatment of protocol processing.[349]"

Essentially in Computer Inquiry III, in deciding not to use protocols as a differentiation factor and later saying it would, what the FCC was actually saying is what it had said in the Computer I inquiry. It was maintaining the basic versus enhanced differentiation and this was the same as saying communications versus data processing. The thing to note here is that communications processing was defined as using basic protocols while data processing uses enhanced protocols. The discussions have shown that this is not the case. The current technology now makes this differentiation obsolete. This underscores the quandary the FCC and other regulators are in.

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[348] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, I Introduction (7) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 8, By the Editors of Telephone News 1986.
[349] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, I Introduction (7), Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 9, By the Editors of Telephone News 1986.

Finding a rationale or underlying principle for differentiating telephony service provision has not been an easy issue. The FCC has been grappling with how to deal with protocol processing for a while. In fact, in 1983, it had issued a Protocols Order[350], in which it had concluded that protocol processing should remain an enhanced service. The FCC revisited this in Computer Inquiry III by writing[351]:

"We revisited the protocol processing issue in our 1983 Protocols Order. In that Order, we reaffirmed, our conclusion that protocol processing generally should remain an enhanced service, clarified the definition of the application and expressed a willingness to entertain waiver requests to mitigate what we and many in the industry were beginning to perceive were some of the undesirable consequences of our treatment of protocol conversion."

In the Protocols Order of 1983, the FCC had done the following three things:[352]

#1) It recognized that a basic switched service can include protocol processing for starting, routing and ending calls or data packets. It also recognized that such protocol processing may be inherent and therefore a part of a basic or enhanced service.

#2) It recognized that the definition of enhanced service may limit the ability of the carrier to give new services. As such the FCC held itself available and open to petitions that wanted to implement new technology.

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[350] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (D) (2) (21), Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 17, By the Editors of Telephone News 1986.

[351] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (D) (2) (21) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 17, By the Editors of Telephone News 1986.

[352] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (D) (2) (21) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 17, By the Editors of Telephone News 1986.

In this regard, the FCC was probably concerned that even though it had defined enhanced services as one in which ‘the format, content, code and protocol” are acted upon by data processing, this could be construed and seen as basic. This is because it could be argued that any service is in actual fact a basic service, if it can be logically shown that the calls of the protocols are actually inherent and part of the service.

#3) It noted that it will look favorably on petitions for internetworking protocols that incorporated basic services and did not separate it (Basic Services) from the new offering as opposed to a possible unfavorable answer to those that tried to do this.

Essentially in these rulings, the FCC was making sure that basic services were always a part of any service. The FCC was in actuality saying, that any thing new and hence all regulations that would be taken would incorporate the medium in it. In fact, the FCC clarified and solidified what it had said in #3) by noting the following[353]:

“ We stated that we would grant waivers requests only on the condition that ‘underlying transparent transmission facilities, which are comparable in price, quality and condition of service to that built into the offering to be associated with protocols conversion, remain available generally and unencumbered by protocol conversion’”

[353] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, II Background (D) (2) (23) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 18, By the Editors of Telephone News 1986.

The Sameness of Basic and Enhanced Services

At this point, it would be good idea to look again briefly at the concepts of protocols. The Protocols are the rules in computing and networking. They are actually embedded in the Application Programming Interfaces, Middleware and Functional units that provide the intelligence in a network. They run the range from protocols that deal with how the medium is used by the devices at the physical layer to protocols that deal with how information is arranged and transported across the medium to protocols that deal with how the application exchange information and how this information exchange is seen by a client or user as a particular product. All of this is made possible by the use of call routines which are used across the network.

In this instance, 'information' can be defined as the steps, and procedures that are actually involved in the processing aspect as well as the actual data that is actually 'moved' from one point to the other. This is not all, they also deal with how the network is managed by providing, management, environmental and control information. However, to focus the discussion down to intelligence in a network is to bring it down to it most basic form. This is in actuality to bring it down to the way in which in a standalone computer, that is not networked, deals with the components that it uses. From this manner, it can be extended to how a network uses and works with protocols. The manner in which the operating system and a program deal with each other in a non networked environment is that they communicate and talk with each other by using "calls" and "routines"**.** Calls and routines are also used to present to the user the format and information that is seen in a standalone situation. Program Calls and routines are the basis of protocols and in reality they are [protocols] that are differentiated only by the 'functional processes' [i.e. the program functions] they perform. Protocol Stacks are built from 'stacked' program functions, and even though they are basically the same ‘code-wise’, when they are made to do some thing differently this becomes and [is] a different ‘ application function’. In the same way, Services are built up by different ‘functional stacks” and these form different applications that do different things. In a nut shell, the same program calls and routines of the APIs and Middleware are stacked differently to give different applications. These applications then form the intelligence in the network and are what are located in the intelligent devices.

In a networked environment, the operating system, the applications, and data as information are usually not all in one place but in different computers which could be in several different locations. The basic calls and routines that are found in the intelligence components of the “network” create an environment in which the perception of being in one is made possible. The sending computer communicates with the receiving computer along established rules that both observe.

What happens with protocol structuring is that the calls and routines – the intelligence have been separated into levels or areas. These are the levels or boundaries that are seen in the layers of the different standard protocol models such as OSI and the TCP/IP model which try to bring to the computing world a “a general rule” or form as it were as to how information “ should “ function and flow. What is actually happening is that a “call” – a program routine is seen as being classified into a level based on a function that it carries out. These calls and routines are what are put together in the different manner to form specific protocol stacks which in essence form the different processes that different services use. These calls and routines as user or program services are ‘located’ in computers which are the intelligent devices.

In standalone mode, the computer uses intelligent calls and routines that are in one place [- in a particular computer, device or node] to get information from a user using as interface a monitor and key board, which it processes to give the user a reply or answer back. In a networked environment, even when boundary and masquerading devices are used as protection and barriers for security purposes, the whole perception that is given is that processing occurred on a single computer and to do this, information moves from point A to a Point B seamlessly over a spatial distance. In a networked environment, what is 'new' is that a new "component" has been added to the mix. This is the medium. The medium allows for the "movement" to occur.

When computers are used in the transmission of voices, the same thing occurs. Voice in this instance is treated as information. In voice transference between two individuals using two intelligent devices, the two parties are not in the same place. They are usually in very diverse or disparate locations. However, the calls, routines and components [protocols] that are part of the intelligence in the network give the perception or illusion that they are in the same place. Even when pictures are added as in the case of video conferencing, or phone cameras, or the Internet, this 'perception or illusion' is made possible that they are all occurring in the same immediate vicinity.

This illustration shows an inconsistency in reality in what the FCC said in its Protocol Order of 1983 and the rulings of Computer Inquiries II and III. In the 1983 Protocol Order as shown in #3, it wanted Basic Services to be part of Enhanced Services. This is tantamount to saying that there cannot be an Enhanced Service without a Basic Service, However, the FCC in Computer Inquiry III by maintaining the stipulation of an Enhanced Service as opposed to a Basic Service which is not possible was in actuality, willing to allow two forms of regulation even though this may not be the best regulatory stance.

At this period in time, by keeping with this Basic and Enhance Service dichotomies, it would seem that the FCC was saying that the medium and its components had or used minimal intelligence as is seen by the Basic Service definition as opposed to the Enhanced service when in actuality the medium and the components that are regarded as services [the applications] are a complete ‘whole’ that form the functions of the services.

To bring this technical concept to policy then is to see what those who are advocating regulations on the basis of levels of the layers are asking for. They are advocating that pieces of functions get separated out on the basis of the layers they are in. There has been much debate and discussion on regulating only the lower and physical layers of the OSI model while leaving the upper application and content layer free of regulations (Whitt , 2004). In light of the forgone discussion one has to ask if this is the correct way of regulating. My argument here is that should the FCC choose to regulate by layers it will in fact be regulating by Title Codes. Simply put, Layers regulations is the same as Silo – or Title Code Regulations.

In regulating by Title codes, the FCC and the legal formulating bodies in the USA has relegated the medium as distinct from the services that the medium was part of and for which it provided transport. In the different Titles of the Legal Code of the USA it would seem that mistakenly, the medium aspect had been seen differently from the broadcasting – TV, Cable and radio aspects when in actuality these are complete only when they taken and are seen as a whole. If this is the case, this would show an inconsistency in this way of issuing policies that is inherent in the system and which in effect is what is getting built upon even whether it is by way of vertical silo regulations or by way of horizontal layers regulations. What this is saying is that both sides of the argument would be in actuality supporting the other's argument without their being aware of it. If the vertical silo method is the same as the horizontal layers method of regulating because among other things, the fundamentals of protocol processing in the two have been shown to be neutral therefore making the two sets of services – (in this early stage basic and enhanced the same) , this brings to the fore the question is there a different way of regulating that is more suitable? To answer this question, one has to look at the policies for regulating that the FCC, the Congress and the Courts have made subsequent to 1986 and this will involve looking at the Communications Act of the 104th Congress of 1996 and the 2003 Triennial Order of the FCC.

Before looking at the decisions after the Protocols Order and Computer III which are in subsequent rulings there are some more questions that have to be asked? These question pave the way for the answers that will be obtained and for the conclusions that will have to be made.

Finding Answers for Defining Concept of a "Whole"

Among the questions that have to be asked are:

1) Is it possible to separate a call, a program function or a program from its protocols?

2) Is it possible to separate a service, a protocol stack from the applications or content or 'use or value' provided?

3) If a service is given or defined by a particular protocol stack, and that protocol is taken or is given as a application, can the functions of that stack be separated from the stack?

4) Can the functions be separated from the applications? Essentially can layers be used to regulate a particular part of the service and not the service itself?

5) Take VoIP, H.323 defines a particular protocol stack for VoIP. So does SIP. Is it possible to unravel the layers in H.323 and the layers of H.323 and separate them on the basis of physical layers which should be regulated and applications layers which is not to be regulated and is this the right thing to do?

6)Core to these questions is an underlying question of is or is not the medium part of the intelligence of a network?

One such way of looking at these questions is to ask an analogous question such as for example – is an engine a car? Is a car door a car? Some can argue that the car market can be regulated by regulating these different components and in regulating these components the car industry is by default regulated. Although this argument may hold however, it does not change the fact that there is a car parts market and a car industry that is a whole complete entity which is different from the car component industry. The regulations may work on different parts of the entity –car but that does not diminish the fact that in general the "whole' car exists and is a complete 'whole' different from the engine or the door. The same can hold for example a fruit.

To one selecting a fruit, or for that matter anything that belongs to a particular industry, the selection is made taking into consideration the "whole" of an item not just its elements. The item cannot be disaggregated from it components parts. Some though may disagree and argue that it is possible in any industry to have and select just a component. In this case then the component automatically assumes the identity of a "whole". The component cannot again be disaggregated from the elements that define it. It is the elements that it has that defines it and gives it its unique identity.

This is the same with Data Processing, Information Technology and Telecommunications as a whole at the start of the C21, there is an integrative whole that is different from its parts. VoIP for example, can be represented by "Protocol stack" H.323 or "Protocol Stack" SIP. Take the Protocol Stack H.323 for instance. H.323 uses Registration, Admission and Status (RAS) protocols for call routing.[354] Part of its protocol stack is H.225 for phone call setup, [355] as well as H.245 for protocol capabilities exchange[356]. Two other protocols are protocol Q.931 which is a layer 3 network protocol[357] for signaling that allows it to use the Integrated Services Digital Network (ISDN) and the Signaling System 7 (SS7) protocols which allow H.323 to integrate with traditional voice networks such as the PSTN.[358] ISDN and SS7 are primarily concerned with movement along the medium. In the case of H.323, RAS is different from H.225 and this is in turn different from Q.931. H.225 is a part of H.323 but it is not H.323. So is RAS, and Q.931. They are a part of the total protocol but they are not the application. Of interest and relevant to the study however is the fact that RAS, H.225 and Q.931 are what makes up H.323.

Therefore, when the VoIP application H.323 is discussed, implied in the discussion is the separate but whole aspects of the components that make up this application. If for an instance, the underlying access medium that is used is isolated such as, Gigabit Ethernet, DSL, ATM, ISDN, SS7, SONET, then a discussion of this Application is not

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[354] International Engineering Consortium, Cisco Systems, Understanding Packet Voice Protocols, H.323, http://ww.iec.org/online/tutorials/packet_voice/topic04.html.
[355] International Engineering Consortium, Cisco Systems, Understanding Packet Voice Protocols, H.323, http://ww.iec.org/online/tutorials/packet_voice/topic04.html.
[356] International Engineering Consortium, Cisco Systems, Understanding Packet Voice Protocols, H.323, http://ww.iec.org/online/tutorials/packet_voice/topic04.html.
[357] Network Dictionary, Q931: ISDN Network Layer Protocol for signaling , http://www.networkdictionary.com/protocols/q931.php.
[358] International Engineering Consortium, Cisco Systems, Understanding Packet Voice Protocols, H.323, http://ww.iec.org/online/tutorials/packet_voice/topic04.html.

complete. This is because, essentially all protocol components of H.323 that contribute to H.323 including the ones that deals with the medium are what gives it its specific wholeness – A Voice over IP protocol and as such a voice over IP application and in terms of telephony, a voice over IP service. It is the "complete package" that is the service. It is not the isolated services (protocols) that make up an enhanced service. Similarly, it is not an isolated protocol that makes up a data processing service.

If the premise is given as I have stated it above, then by relating to Bundle and Substance Theories, the argument can be made that, if a component has a whole identity when it is seen as a piece abstracted from the whole, in addition to the fact that, that same component can act as a part that contributes to the wholeness of another item, then it is possible to regulate only the aspects of a " whole". That is to say regulate only the pieces. If this reasoning is accepted then a piece of a "whole" or in the case of telecoms for example, for a particular service or offering, it can then be argued that a layer in that offering can be abstracted from the whole and regulated. As a result it then it can also be argued that in general, horizontal pieces or horizontal layers of telecommunications models can then be regulated. Following this line of reasoning, in the case of VoIP for example, it could then be argued that the physical aspects or those layers of VoIP – the lower layers that deal with the physical access can be regulated while the upper application layers stays unregulated.

In the USA, this reasoning may have held prior to deregulation of the industry when there was a simple monopoly in the Telecommunications Industry. Given that this is not the case currently, to regulate one segment of the industry just because it is the physical layer or the applications layers would in effect become and be seen as an arbitrary method of regulation which would lack an ‘efficiency ‘aspect. The FCC in Computer III wrote, that its statutory obligations were to:

“ ..Make available as far as possible to all the people of the United States rapid [and] efficient …communications service”.[359]

In this statement the FCC in a way, answers all the 6 questions that I posed at the start of this section. These six questions deal with a factor of efficiency. I copy them here again with the answers that have been gained from this study so far.

1) Is it possible to separate a call, a program function or a program from its protocols?
This is not possible because the programs, program functions or the calls are the protocols.

2) Is it possible to separate a service, a protocol stack from the applications or content or ‘use or value’ provided?
The answer is similar to that of #1. The fact is that the protocol stacks are what in fact delivers the applications or services. Protocol stacks and applications are the same.

3) If service is given or defined as a particular protocol stack, and that protocol is taken or is given as a application, can the functions of that stack be separated from the service?
This answer is again the same as #2. The service has been shown to be the application and the application has been shown to be the protocol stack which is in turn at its

[359] Section 2: The Complete FCC Report and Order on Computer Inquiry 3 (Docket No. 85-229), 86-252 36693, I Introduction (1) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 5 , By the Editors of Telephone News 1986.

smallest form are the software program routines and calls that all programs have in common.

4) Can the intelligent functions be separated from the applications? Essentially can layers be used to regulate a particular part of the service and not the total service itself? The answer to this is that given that the intelligent functions are the modules of the application to separate out functions will be in fact changing the application by looking at only a piece of it. By this reasoning then, regulating a particular part of the service and not the total service itself, will in fact be regulating something other than the service.

5) Take VoIP, H.323 defines a particular protocol stack for VoIP. So does SIP. Is it possible to unravel the layers in H.323 and the layers of H.323 and separate them on the basis of physical layers which should be regulated and applications layers which is not to be regulated? Is this the right and appropriate policy to make?

It is possible to unravel the protocols, however, if the protocols are unraveled, then in regulating only a portion of the total protocol stack will not be the same thing as regulating the VoIP service. This may not be an appropriate policy move.

6) Core to these questions is an underlying question of is or is not the medium part of the intelligence of a network?

It has been shown that the medium and its intelligence is the part of what completes a total network and is also part of what contributes to the end to end connection of services. The total whole service is given by the intelligence of the medium, the medium, the intelligence of the distributed network elements and the network elements. These different applications give a complete whole service.

What the questions posed above and the answers provided from the foregone discussions show are that the " measure of efficiency "from the telecommunications perceptive is given by the fact that the upper layers cannot exist without the lower layers. In networking, the layers even though they are given as horizontal work in both a horizontal and a vertical manner. As long as a service is involved, the layers cease to be individual sliced pieces but instead become an integral function of a whole. As long as a connection is made from one device to another, the layers again take on an integrated role. The functional aspects of the 'layers' of networks has this built into them. Adjacent horizontal layers "confer" with each other, exchange information and then pass control and other data information on to a vertical layer. Horizontal layer elements work together with vertical layer elements for a completeness to occur.

The foregone discussions have enabled the reader to conceptualize and bring together pieces and wholes in parts of a telecommunications network by enabling them to disaggregate and then bring back together the pieces and see how they were affected by regulations at the time the regulations was made. This showed that basically there was were flaws and inconsistencies with the concept of basic as opposed to enhanced services from a standpoint of efficiency.

In its supplemental order of Computer Inquiry III of 1986, the FCC concluded that it was going to maintain its current definition of Enhanced services and did not invite any further comments on this with regards to protocol processing[360]. As such regulation

[360] Section 3: Supplemental Notice of Proposed Rulemaking, (Docket No. 85-229), Phase II , II (A) (13) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 6 , By the Editors of Telephone News 1986.

continued using the policies provided for basic services as opposed to enhanced services. In 1996, however, when the 104th Congress made the Communications Act of 1996 which essentially removed the restrictions on the provision of telecommunications services, the terms Basic and Enhanced services were not used in their legal definitions. The terms that the Congress of the USA used were Telecommunications and Information services. The effects of these regulations will be looked at in the next chapter.

CHAPTER 14

TELECOMMUNICATIONS AND INFORMATION SERVICES ARE THE SAME.

In the last section I illustrated that the neutrality of protocols makes basic and enhanced services the same as they relate to telephony and Internet related services provision and argued that the horizontal layers method of regulating was basically the same as the vertical layers method of regulating. I also showed that the laws as existed then had flaws in them but that this was the best that the FCC could do at the time. In this section I will do the same thing and show that Telecommunications and Information Services are also essentially the same and that there are still some inherent flaws in these laws as currently used. The laws that will be looked at in this instance are the Telecommunication Act of 1996 and the Triennial Report of 2003.

Telecommunications Services and Information Services

On Wednesday January 3rd., 1996, the 104th Congress of the United States of America, released the Communications Act of 1996,[361] which amended the Communications Act of 1934. The major regulation of this act was that given under 251(c)(3) which required that incumbent local exchange carriers ILECs, opened up and allowed new competitive entrants access to elements of their network in an unbundled way and that at the same time, this access was to be at a cost-based rate.[362] In this Act of 1996, the terminology given to elements pertaining to computer processes and telecommunications processes were different from that which the FCC had been using. The Congress of the USA did not use the terms, “Basic and Enhanced Services” in describing Computer services and

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[361] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, http://www.fcc.gov/telecom.html.

[362] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (I)(2), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

Telecommunication services such as the FCC had used in Computer Inquiry II and Computer Inquiry III but rather, the Congress of the USA used the terms "Telecommunications Services " and " Information Services" which can be inferred to be referring to Basic and Enhanced Services respectively. The 104th Congress defined Information Services as follows in SEC. 3(a)(2)'(41):

"…means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications and includes electronic publishing, **but does not include any use of any such capability for the management, control or operation of a telecommunications service**.[363]

Of importance here with this definition is that the 104th Congress included electronic publishing as part of Information Services while it excluded management, control or operation of a telecommunications service as part of this definition.

Furthermore, the 104th Congress defined Telecommunications Carriers in SEC. 3(a)(2)'(50) as:

… any provider of telecommunications services, … A telecommunications carrier shall be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services.[364]

It also defined Telecommunications Services (SEC. 3)(a)(2)'(51) as:

"… the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available to the public, regardless of facilities used.[365]

Extrapolating from the last two rules, a policy statement that evolves is that if a provider supplies telecommunications services to the public, then that provider is automatically a

[363] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(41), http://www.fcc.gov/telecom.html.
[364] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(50), http://www.fcc.gov/telecom.html.
[365] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(51) http://www.fcc.gov/telecom.html.

common carrier regardless of the facilities used. Facilities in this instance are the network elements that form networks and the 104th Congress had a definition for these as well.

Network Elements, (SEC. 3)(a)(2)‘(45) had the following definition:

“A facility or equipment used in the provision of a telecommunications service. Such terms also includes features, functions and capabilities that are provided by means of such facility or equipment, including subscriber numbers databases, signaling systems, and information sufficient for billing and collection or used in transmission or other provision service.[366]

In the preceding sections of this paper, I argued and showed that the Network Elements include the actual physical wired or wireless medium as well as the gateway, gatekeeper elements and the end devices that users manipulate and use for information and service provision. Embedded in the intelligence of the gatekeeper and gateway devices are the tools such as the multiplexers that are used in the concatenating of transmission lines/channels or de-multiplexers which are used in the isolating of these lines/channels. These transmission paths are located in the medium. In telephony, this form of intelligence was in the past found in the Central Office in the switching devices of the PSTN. However, now, with distributed networking they are found in node devices that are not necessarily in the Central Office. What present technological ’ tools’ allow voice telephony to do is to be able to convert analog signals to digital signals. These ‘tools’ are actually programs which are subset of larger program modules and program calls that make up the intelligence located in these intelligent devices. The definition of Network Elements as given by the 104th Congress therefore has embedded in it by default the logic and intelligence that these units have. The end aim or goal in the use of

[366] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)‘(45) http://www.fcc.gov/telecom.html.

these network elements and devices is to make points in a computer networks connect to others seamlessly.

It is this concept of networks that is essentially at basic core of the act of the 104th Congress in the Unbundling Act of 1996. What this unbundling Act of 1996 did is that it recognized, mandated as well as put into the Title Codes of the Laws of the United States of America what had already been happening in the Telecommunications Industry. It moved from looking at protocols to looking at the importance of networks. Therefore, analogous to the "Basic Services" the FCC had used, the 104th Congress defined and used "Telecommunication Services". In using this definition, the 104 did the following:

1) It took one network owned by a few monopolistic long distance carriers and broke it down to whereby there are many networks in it.

2) It took regional networks owned by LECs and BOC and broke those different networks into several different networks that are operated by competitive LECs (CLECs).

Furthermore from a technical perspective, what the Act of 1996 did was it took the emphasis away from the protocol processes and put them into networks with intelligence and intelligent processes. It took the stand that when these Telecommunications Services have features added to them that do more than just allow the ' lines' to be segmented which was what the PSTN switching was doing, there is movement from Telecommunications Services to Information Services. These Information Services are created by the intelligence in the elements of the network. Also as had been shown earlier, this intelligence are the processes of the protocols which are performed by the network elements. Essentially then, what the 104th Congress tried to do was take the onus from looking at regulation from a protocol perspective and look at the next larger picture which was the network perspective. It moved the policy formulation process that the FCC had started using Basic and Enhanced Services, with Enhanced Services doing more than Basic Services to the Network level using Information Services doing more than Telecommunications Services. In this regards it could be explained that the 104th Congress was building on or at least trying to provide a solution to a regulatory need that the FCC had expressed in Computer III when it wrote the following about applications and protocols:[367]

"In all of these applications, we note a common characteristic. The purpose of protocol processing in these application is to **permit inter-device communications without changing** the **content** of the **information** being transferred. In acting upon a transmission's protocol symbol and information symbols, protocol conversion neither intentionally creates new information, nor deletes or modifies existing information. It **has utility** whether or not a common carrier network is interposed between the devices. Therefore, we wish to consider whether an appropriate regulatory policy for protocol processing would be to treat it as essentially a neutral function (i.e., a function that, by itself, is neither an enhanced nor a basic service), which can be employed by (a) regulated common carriers …(b) enhanced service providers …(c) users of data processing equipment or CPE in conjunction with on-site, inter-device communications or, alternatively with a common carrier interconnection."

Access Standards

However, even with the mandate that the FCC has from the 104th Congress, to use a 'new' way of looking at services it is still challenged in how it should regulate the telecommunications process that these services are part of. An example of this is seen in the case of AT&T v Iowa Utilities Board, in 1998, the FCC writes that the Supreme Court in its final conclusion noted that[368]:

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[367] Section 3: Supplemental Notice of Proposed Rulemaking, (Docket No. 85-229), Phase II , II (C)(2) (b)(26) Deborah Eby, Linda M. Buckley, Barbara H. Bink, Understanding Computer 3, p 15 , By the Editors of Telephone News 1986.

[368] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (I)(17), p 21, http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

" … "if Congress had wanted to give blanket access to incumbents' networks on a basis as unrestricted as the scheme the Commission has come up with, it would not have included Sec. 251(d)(2) in the statute at all" Instead, "[i]t would simply have said…that whatever requested element can be provided must be provided."

At the same time, the Court declined to find that section 251(d)(2) incorporates something akin to the "essential facilities doctrine" as argued by the incumbent LECs. The Court found that it need not decide whether the statue requires applications of that standards as a matter of law, adding

"it may be that some other standard would provide an equivalent or better criterion for the limitation upon network element availability that the statue has in mind" ."

Essentially the Supreme Court was saying that Congress had not given an open access to the incumbents' network in the manner that the Commission had interpreted it to mean. At this time, this occurred because the FCC, the Incumbents, the CLECs and the PUCs were all trying to find a ways of interpreting the new rules for effective policy implementations. In fact, this illustrates a quandary that the 104th Congress itself must have been facing that ended up creating an inconsistency in the law. To highlight this inconsistency requires a look at what the 104th had said in the Communications Act of 1996. Their statement as recorded in the language of Sec 251(d)(2) states:[369]"

" Access Standards – In determining what network elements should be made available for purposes of subsection (c)(3), the Commission should consider at a minimum, whether –
'(A) access to such network elements as are propriety in nature is necessary; and
'(B) the failure to provide access to such network elements would impair the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer.

Two important questions immediately come to mind with this ruling:

a) Is access to elements that are propriety in nature necessary?

b) Would the failure to have access to such network elements limit the ability of the telecommunication carrier who wants to provide certain services?

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[369] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 251 '(d)(2), http://www.fcc.gov/telecom.html.

At a minimum here, what has to be considered is first of all to look at this from a time frame perspective. In 1996 was when the Telecommunications Act was given, Congress defined Telecommunications Carrier in SEC. 3(a) (2)'(49) as[370] :

"…any provider of telecommunications services…A telecommunications carrier shall be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services,…"

Furthermore, the 104th Congress has defined Telecommunications Services in SEC.3(a)(2)'(51) as:

"… offering of telecommunications for a fee directly to the public or to such classes of users as to be effectively available directly to the public **regardless** of the facilities used.'[371]

First of all, the impression that could be drawn according to the definition that Congress gave was that Telecommunications service was going to be directly available to the public through the auspices of a Telecommunications Common Carrier. In reality though, this is not always the case since services do not always go directly to the public. Even when the additional clause of "classes of user" is used in the definition it assumes that the end result of the service is for direct access to the public. What this definition eliminates are non public users which could in this instance be businesses or other institutions, or as in seen currently, other service providers who would in turn provide their services to non public users. Therefore, because of the fact that they are in the middle between the incumbents and the end public user, this amends the "direct public" use clause. At the time of the making of this rule, the 104th Congress may not have known that the telecommunications service sector would become competitively

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[370] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(49) http://www.fcc.gov/telecom.html.
[371] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(51) http://www.fcc.gov/telecom.html.

splintered into the way it is right now. This causes the problem of trying to find out what the 104th Congress meant with regards to how Network Elements were to be made available by Incumbents. There were now unknown categories that it had not planned for nor identified and this resulted in the bevy of lawsuits that occurred even after the new Act.

The second thing is that in SEC.3(a)(2)'(51), the 104th Congress stated that telecommunications [services] should be made effectively available **regardless** of the facilities used. This brings then in to focus the test for effectiveness and touches on the question of propriety elements. Do propriety networks limit effective transmission of services or are there already built into the law, safeguards against this happening? From the answer to this new question, the two questions that were posed earlier about the provision of access can be answered. This involves looking at is the definition of elements of a network as given by the 104th Congress.

Network Elements as defined by the 104th Congress in SEC. 3(a)(2)'(45) is[372]:

"… a facility or equipment used in the provision of a telecommunications services. Such term includes features, functions, and capabilities that are provided by means of such facility or equipment including subscriber numbers, databases, signaling systems, and information sufficient for billing and collection or used in the transmission, routing, or other provision of a telecommunication service. "

The 104th Congress then noted that these network elements should be made available in an **Unbundled Access** by writing in SEC. 251'(c)'(3):[373]

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[372] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(45) http://www.fcc.gov/telecom.html.
[373] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 251 '(c)'(3) http://www.fcc.gov/telecom.html.

“The **duty** to provide, to **any** requesting telecommunications carrier for the provision of a **telecommunication service nondiscriminatory access** to **network elements** on an **unbundled basis** at any technically feasible point on rates, terms, and conditions that are reasonable, and nondiscriminatory in accordance with the terms and conditions of the agreement and the requirements of this section and section 252. An incumbent local exchange carrier shall provide such unbundled network elements in **a manner** that allows **requesting carriers to combine such elements in order to provide such telecommunications service**.”

Of importance here are the following: 1) **Duty** is involved and the onus has been put on the incumbent to “do” or ‘provide’ network element and is thereby so ordered. 2) The law states that **any** telecommunications carrier requester should be grated access 3) Access must be in a **manner** which is **unbundled**. 4) The local exchange carrier (is required by the law) to provide both the **access and the elements** in a way such that the requesting carrier can combine the elements to provide the service they want to.

The words of the law here and the essence and the meaning behind the words make the requesting Telecommunications Carrier in this case the CLECs, the ones who ‘can’ say they have been denied access or not. Accordingly, regardless of whether the propriety network has ‘generalities’ in place that allow the requesting competitive telecommunications service provider to be able to use what the incumbent local exchange carrier has provided to them for the implementation of their new services, these CLECs can always make a claim that there is something they still need or some missing network element or network capability that limits their ability and capability to provide a service they want to. The wording of the Law has in this instance provided an ‘inconsistency’. What this inconsistency in the law therefore does, is that it makes moot the question “… is access to elements that are propriety necessary” as well as its corollary ..”would failure to have access limit those who want to provide a service?” This is because a telecommunications requester can always answer “yes” to these question – as they will always see it in their best interest to have more and more insight into what the incumbents who are essentially their competition is doing.

In essence then, what the Supreme Court in the case of AT & T v Iowa Utilities Board in 1998 concluded by saying that the 104th Congress had not given a "blanket" access to the incumbent' network in is reality not the case. The laws as given by the 104th Congress as discussed above in the actuality did just this.

Effects of Unbundling Ruling on Service Provision

After dealing with the ruling that the 104th Congress made as to how the networks of incumbents should be accessed by looking at the unbundling laws on accessibility of network elements as it is provided to CLECs, the next thing is to see the effect on these rulings on information and telecommunications services provisions. This part of the study will look at how the laws affect the understanding of what a Telecommunications Service is as against what Information service is and who should have access.

In the Triennial Report of 2003, (V)(B)(2)(c)(ii) (148) the FCC wrote[374]:

"We disagree with commentators that state that the Act prohibits the use of UNEs for information services. Section 251,(c)(3) states that incumbent LECs have a duty "to provide, to **any** requesting telecommunications carrier for the provision of a telecommunications service, nondiscriminatory access to network elements on an unbundled basis"

In looking at this ruling further, it is important to note that If this is not the case that one group should be excluded, and that any telecommunication carrier can have access to UNEs, then what this logically means is that there is no need for the two different

[374] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (V)(B)(2)(c)(ii) (148), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

terminologies or definitions of Information Service Providers or Telecommunications Service Providers – or for that matter differentiation between Information Service Providers and Telecommunications Service Providers.

The rationale for this statement can be given as follows: 1) I have shown that Basic Service as stipulated by the law has to be a part of Enhanced Services and that this was given in Computer Inquiry III. 2) I have also shown that Telecommunication Service is the same as Basic Service and that Information Service is 'enhanced' Telecommunication service. 3) I have also shown that Basic Service is the same as Telecommunications Service. By this logic then Telecommunications Service is the same as Information Service. If these reasons as given hold, then it is not necessary to have a differentiation for telecommunications services as distinct from information services. This is underscored here by the FCC's statement in (V)(B)(2)(c)(ii) (148)[375] that :

" The statute does not require that access be provided exclusively **for telecommunications** services.' .

If access is not exclusively for telecommunications service then there is no need for a telecommunications service distinction or for that matter an information service distinction. The implication that access is also for information services comes embedded with the notion that Telecommunications Service is the same as Information Service. This proves that the FCC in its ruling had by default also made Information Services the same as Telecommunications services by ruling that access to a UNE was not to be

[375] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (V)(B)(2)(c)(ii) (148), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

restricted where the provision of services was concerned and was therefore open. In fact the FCC had explicitly made this ruling when it wrote FCC in (V)(B)(2)(c)(ii)(143) of the Triennial Report[376]:

" We conclude that, once a requesting carrier has obtained access to a UNE to provide a qualifying service as defined above, the carrier may use that UNE to provide any additional services, as defined above, the carrier may use the UNE to provide any additional services, including non-qualifying telecommunications and information services… In other words, once the Commission has determined to impose "the costs associated with mandatory unbundling" upon an incumbent LEC, it would be wasteful for the network element not to be put to its maximum use:"

What this ruling shows is that the FCC was in fact leaving wide open what could be considered as qualifying to have access to the Network Elements. This was in a way to compensate for the inconsistency in the rules as given by the 104th Congress. In this manner of hedging, the FCC was trying to predict what different scenarios may crop up. It is in this overcompensation that the FCC again shows an inconsistency in the manner of regulating as it relates to the distinction of Telecommunications Services as opposed to Information services. If such a wide range of services can be considered as qualified to have access to the UNE this means that there is really no need for classifications beyond the term Telecommunications Service.

This discussion shows the problems of trying to formulate regulatory policies for an evolving Telecommunications Industry that is constantly amorphous and one in which the distinctions as defined really, as has been shown, are some cases inconsistent and can be considered contradictory because by the time the law changes to meet a need

[376] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (V)(B)(2)(c)(ii)(143), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

that had been highlighted, the technology in most cases had worked to solve the problem. Another challenge that the law makers face is that the technology that makes it possible for similar service provisions has generated newer types of competition such that competition is not only among LECs, or among CLECs but also among LECs and CLECs. This might explain the rationale for the wide and rather open policy definitions that the FCC provides and which show up as inconsistencies. The FCC tried to address this close similarity of the two types of serves in (V)(B)(2)(c)(ii)(148) of the Triennial Report of 2003. As an example, it noted that the reason that is does not have a prohibition against Telecommunications carriers having access to information services is that: [377]

"Competitive LECs are providing integrated telecommunications and information services offerings in direct competition with the incumbent LEC provision of these services. Moreover, such a rule may prohibit the packaging of services that would be considered advanced telecommunications capabilities, but are not telecommunications services themselves thus conflicting with the goals of the Act. "

Although the FCC is saying here that if it prohibited access to information services such a denial would restrict the provision of new services that would be considered advanced telecommunications capabilities, and that this may prevent the Telecommunications Industry from experiencing new growth, thereby resulting in a move which would be contradictory to the goals of the 1996 Act, the fact still remains that in actuality the FCC is still holding on to different distinctions of service types. This is seen in the term 'advanced telecommunication capabilities which is actually equivalent to Information Services. I have shown that from a technological perspective, telecommunications capabilities are an integral part of information capabilities and the two cannot be

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[377] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (V)(B)(2)(c)(ii) (148), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

separated. Therefore, in holding on to the term telecommunications services and in making a distinction between this and Information services , even as the FCC strives to bring equity in its regulatory matters, the end result still send contradictory signs to the total industry.

Impairment

As the FCC and the PUCs work at implementing the specifics of the laws as directed by the Acts from the Congress of the USA, what happens is that in certain areas there still exists uncertainty which sends contradictory signals as to how it regulates. One such area is in the regulation of VoIP regulations.

Telephony On line writes[378]:

"Under current law, VoIP is generally classified as an "information service" and is considered exempt from rules that govern telecommunications services. However, with the growth of VoIP, a number of legacy services, have begun to argue that VoIP traffic should be classified and regulated differently – as a telecommunications services subject to the same requirements as traditional voice calls."

Services such as VoIP have come under scrutiny because they are regulated as Information Services rather than as Telecommunications Services even though they use the same facilities as incumbent telecommunications service providers.   The rationale for this can be traced back to the 1996 Telecommunications Act which specified the following in SEC. 259'(a)[379]:

" The Commission shall prescribe within one year after the date of enactment of the Telecommunications Act of 1996, regulations that require incumbent local exchange carriers (as defined in section 251(h)) to **make available** to any qualifying carrier such public switched **network infrastructure**, technology, information, and telecommunications facilities and functions as may be requested by such qualifying

[378]Telephony on line, Telecom regulation and Voice over IP, Telecom Regulation and Voice over IP, White Paper, February 16 2004, http://research.telephonyonline.com/detauk/RES/1078511693_323.html.

[379] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 259'(a), http://www.fcc.gov/telecom.html.

carrier for the purpose of enabling such qualifying carrier to **provide telecommunications services**, or to **provide access to information services**, in the service area in which such qualifying carrier has requested and obtained designation as eligible telecommunications carrier under section 214(e)"

To Implement this, statues, one of the things the FCC did was to specify and define instances in which new entrants may be prevented from getting access to the infrastructure that was needed for Information Services provision. The FCC then defined instances of impairment that may prevent a requesting competitive carrier access to an incumbent carrier's network. Five barriers to entry were identified by the FCC and these are 1) Economies of scale, 2) Sunk Cost, 3) First mover advantages, 4) Absolute cost advantages, 5) Barriers within the control of the Incumbent LEC. Also, the FCC adopted a new definition of what impairment was with regards to SEC. 251 '(d)'(2)'(B) and this was stated in the Triennial Report in III(21)[380] as:

"[t]he incumbent LEC's failure to provide access to a non proprietary network element "impairs" a requesting carrier…if, taking into consideration the availability of alternative elements outside the incumbent's network, including self-provisioning by a requesting carrier or acquiring an alternative from a third-party supplier, lack of access to that element materially diminishes a requesting carrier's ability to provide the services it seeks to offer."

To be able to use the network and infrastructure of incumbent Information Service Providers need access to the Network Elements. In its rule implementation, although the FCC noted in II (7)[381] of the Triennial Report that:

"…We specifically decline to limit the definition of a "network element" to facilities and equipment actually used in the provision of a telecommunications service",

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[380] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, III(21), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[381] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (II)(7), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

The FCC non-the-less, identified a list of , “Unbundling Requirements for Individual Network Elements”. In this list, the FCC noted the following network elements:1) Mass Market Loops, 2) Enterprise Loops, 3) Sub loops 4) Network Interface Devices(NID), 5) Dedicated Transport, 6) Switching for Enterprise Market(defined as DS1 and above), 7) Switching for Mass Market (defined as DS0), 8) Shared Transport, 9) Packet switching, 10) Signaling Networks, 11) Call Related Databases 12) OSS Functions.

It is these elements that Information Service Providers are using to access the infrastructure of Incumbent Telecommunications Service Providers for the provision of such services as VoIP. What is happening is that the networks that VoIP providers use are currently regulated differently from the networks that are used by Incumbent Telecommunications service providers of voice telephony. As a result of this, the services that are provided are regulated differently. Networks however as were discussed earlier do essentially the same thing. According to Olsson[382]:

“ Networks are defined… as the service production tools, or machines … of telecom actors. …whether it is a mobile voice-oriented network or the Internet that is used… [A]ll networks whether vertical or horizontal can be described with of number of basic functions called fundamental technical plans (FP)… A network must be a user friendly tool, cheap and easy to operate”

At best, a network can be split into two logical systems[383] which are the traffic system and the management system. According to Olsson(2003), a general systems model that hold for all types of network architecture is that there is a traffic system with primarily two main functions – resource and resource control that sustains the end-users while

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382 Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 50, John Wiley and sons Ltd, 2003.
383 Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p 51, John Wiley and sons Ltd, 2003.

the management system which is a function of the traffic system supports its.[384] In a circuit mode or circuit network such as those used in tradition Public Switched Telephone Networks (PSTN), the control messages are usually transmitted differently from the user traffic in separate traffic loops,[385] while, in packet switched networks, user data and the and control message are usually transmitted together.[386]

Also, in circuit switched networks, whenever a connection is made between two points it results in a physical communication channel being set up between the two points that is used exclusively by those points for the duration of a call or session. In a packet switched network however, the user data to be transmitted is first broken down into message units called packets. This is usually done by the source computer device or Data Terminal Equipment (DTE). Enclosed in the header of the packet is the network address of the source as well as the network address of the receiving DTE. The packet is then passed on by means of a Data Circuit Terminating Equipment (DCE) such as a modem[387] or a network connecting device such as a gateway or a switch to the intended destination node. In this transport, there is no established communication path for the packet. As a result of this, packets of the same message may use different paths to get to their destination where they are reassembled into the correct sequence. Increasingly, the Internet which is a packet switched point to point network is being used to perform traditional telecommunications services as information services.

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[384] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p51, John Wiley and sons Ltd, 2003.
[385] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p52, John Wiley and sons Ltd, 2003.
[386] Anders Olsson, Understanding changing telecommunications, Building a Successful Telecoms Business, p52, John Wiley and sons Ltd, 2003.
[387] Stan Schatt, Linking Lans, Second Edition, p 47, Mcgraw-Hill Inc, 1995.

VoIP as a telephony service that is Internet based is helping to blur the line between these two definitions of telecommunications services provisions. This is because VoIP is a telephony service that uses packet switched network rather than the traditional circuit networks that are used by the PSTN of Incumbents for the provisioning of its telephony services and is classified as an Information Services while the Incumbents are still classified as Telecommunications Service Providers. In earlier chapters, I had provided technical arguments to show that present day technology that is used to provide these services such as SIP and H.323 are really distributed versions of the same technology that the PSTN uses. Also, I have given technical arguments to show that Information Services Provision is in reality the same as Telecommunications Service Provisions. As a result of this in reality there is no need for differentiation between telecommunications services and information services.

The fact that the legal statutes as have been shown does not require that UNEs are to be used exclusively for telecommunications services and does not prohibit use of these elements by information services shows a gradual movement by the FCC to a more equitable ways of regulating these new services. However, it still has vestiges of the earlier regulatory model that tried to classify services as ‘basic/telecommunications’ and therefore subject to vertical form of regulation as opposed to ‘enhanced/information’ in which a horizontal regulatory model was considered suitable. I demonstrated in earlier chapters, that with current technologies horizontal and vertical are complementary of each other and therefore cannot be separated or parceled out. The fact remains therefore that until the FCC can device a method by which equitable regulations of new services and technologies are developed and implemented, the current regulations as they exist give a perception of an inconsistency. Using this rationale then, it can be concluded that the requests of those requesting that VoIP be classified as a telecommunications services similar to telephony services is a valid one. What this suggests is that a change or modification is required that recognizes the similarity of the two by either lifting some of the restrictions of incumbent telephony providers or regulating VoIP as telecommunications. This matter will also be looked later when matters that pertain to Internet regulations are discussed generally as part of some of the larger issues of telecommunications regulations and its ensuing implications in the USA in particular. A related matter to this discussion is one that involves to the provision of Cable services.

The findings so far in this paper proved that indeed VoIP is not merely an information service but is in actuality a telecommunications service. What this finding does is that it shows that regulations such as those that pertain to Cable services providers also have to be reviewed. This is because the fact exists that the network elements as tools that are used by both telecommunications service providers is the same that are used by competitive information services providers and is in actuality the same as those that are used by cable service providers for the provision of voice and other Internet services. As a result of this, it highlights the fact that a more comprehensive look at the technologies of Telecommunications Industry as a complete whole are needed to ensure the efficiency of this industry and its related markets. This will avoid the perception of having inconsistent regulatory standards.

What this study so far has shown is that the definition of telecommunications services as compared to information services and other related terminologies in the present time given the technologies that are available, is really an artificial one. In the mean time the FCC tries to keep some regulatory standards as it tries to understand more fully all the different aspects of the not only the telecommunications field but also how this industry as it is now converging and in instances merging with the Internet is operating.

Another regulatory implementation that the FCC used in its unbundling efforts was to give definitions of market types based on the networks that were involved. In classifying the different types of market structures, the FCC also identified what network elements Incumbent LECs were supposed to make available to CLECs. In this area also however, there were inconsistencies that the policy implementation highlighted. Before discussing this problem I will briefly look at the specifics of providing VoIP from the telephony network perspective.   This information is discussed here rather than at the networking section that was discussed earlier to relate the concepts that is being presented more in-situ about loops and switches.   This will emphasize the point that is being made

CHAPTER 15

THE LAW AND TELEPHONY NETWORKS

Regulating Loops and Switches

Waldron et al, 2002, defines VoIP as:

"… a generic term that refers to all types of voice communication using Internet protocol (IP) technology instead of traditional circuit switched technology. This includes the use of packet technologies by telecommunication companies to carry voice at the core of their networks in ways that are not controlled by and are not apparent to end users."[388]

Integral in the provision of VoIP services are gate keeper devices, gateways , servers and high speed broadband Internet medium that provide this service as well as administrate supporting applications, for its provision over the Internet. I have shown that in networks, the network elements are integral to each other and work together to give a 'united whole." I have also shown that all these elements such as the gatekeeper devices are really distributed versions of typical switch devices that are found in traditional PSTN based Central Offices. In relating the technologies of the PSTN with that of the packet switched networks, it is seen that the new packet switching networks are the traditional loops of the PSTN.

In its analysis of loop types, the FCC looked at this from a broad perspective of market type. As a result of this, the FCC came up with two main classifications of loops which are The Mass Market and the Enterprise Market.[389] In the Mass Market, the FCC required the unbundling of copper loops and sub loops of incumbent LECs. In the Enterprise Market, the FCC required of Incumbent LECs the unbundling of dark fiber

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[388] Gerad J. Waldron, Rachel Welch, and James Dempsey, Global Internet Policy initiative, Voice-over-IP, The Future of Communications, April 29th., 2002, http://www.internetpolicy.net, /practices/void.pdf .

[389] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, ((VI)(A)(197),

Loops and DS3 loops. Furthermore, Incumbent LECs were required to provide unbundled access to sub loops.[390] At this point, I will look at some aspects of the components of PSTN Loops and how these tie into current Internet related networks. Furthermore I will relate these technologies to the VoIP technologies and to the cable technologies and look briefly at an inconsistency in the current FCC rulings from the perspective of loops and Switches.

According to Privateline.com, a local loop is a circuit that connects a telephony customer to the telephone network. It provides the customer access to the switching system and it also referred to as a subscriber loop.[391] The function of a local loop is to allow a particular telephony customer access to an incumbent's public switched network Facilities. From this facility calls that are made are routed to other switches and other loops until they reach their destinations. With the unbundling laws these loops have become available for competitive LECS who obtain licenses from Incumbent LECs and use for the transfer of information to their customers. Figure 17 shows an example of loop network architecture[392]. Also, Figure 18 [393]shows the network components in a loop as in a traditional PSTN. Figure 19[394], shows a basic network connection of central offices in a traditional PSTN telephony network.

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[390] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147,II, Executive Summary , http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf

[391] Telecommunications Fundamental, http://www.privateline.com/manual/one.html.

[392] Telecommunications Fundamental, Figure 1.7, http://www.privateline.com/manual/one.html.

[393] Telecommunications Fundamental, Figure 1.6, http://www.privateline.com/manual/one.html.

[394] Telecommunications Fundamental, Figure 2.1, http://www.privateline.com/manual/two.html.

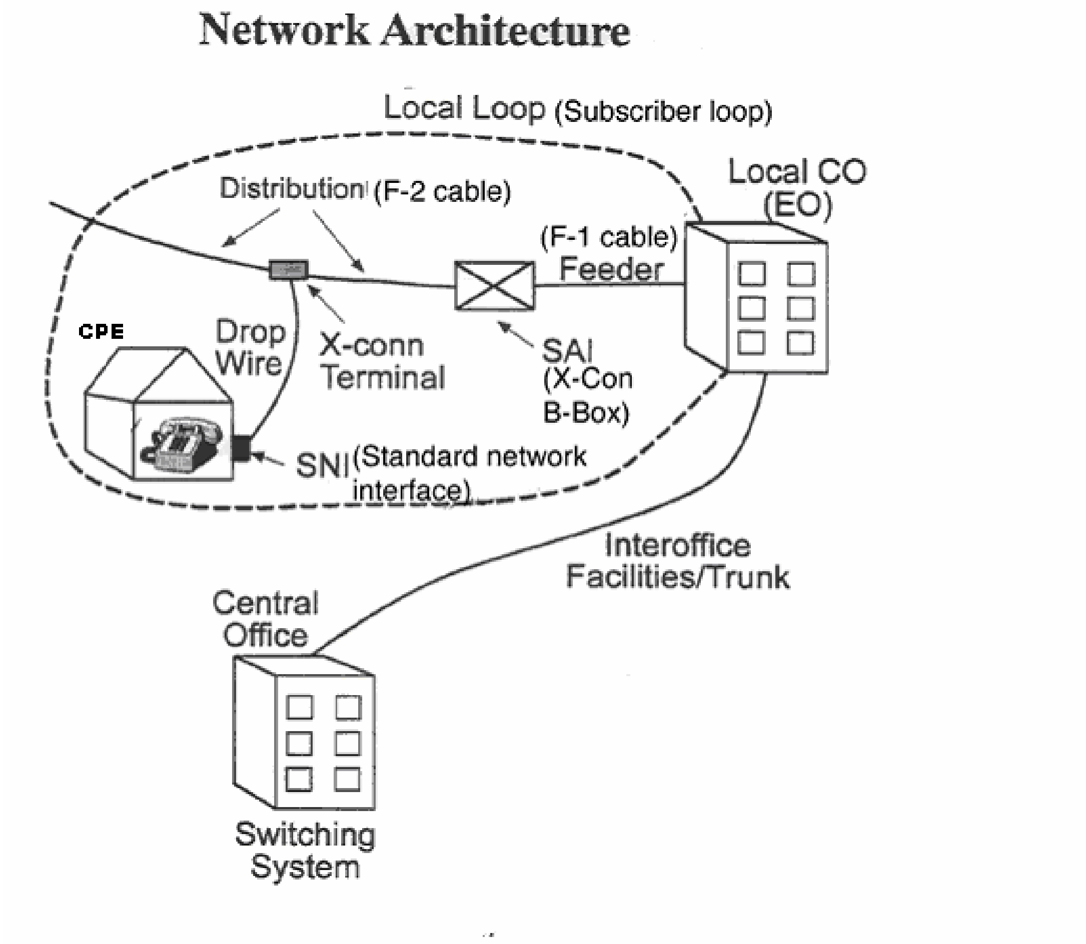


Figure 17   Loop Network Architecture

Source: private Line.com

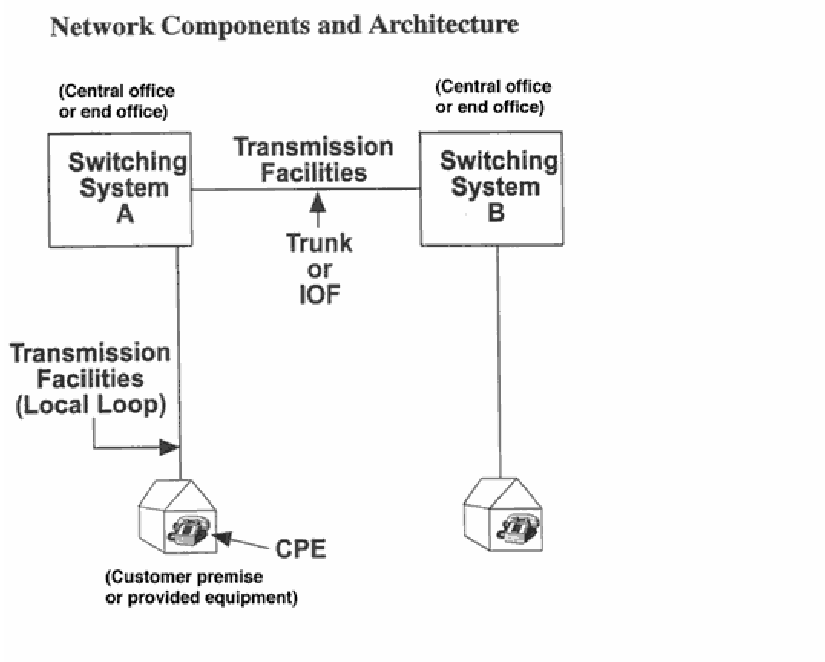


Figure 18 Loop Components and Architecture

Source: Privateline.com

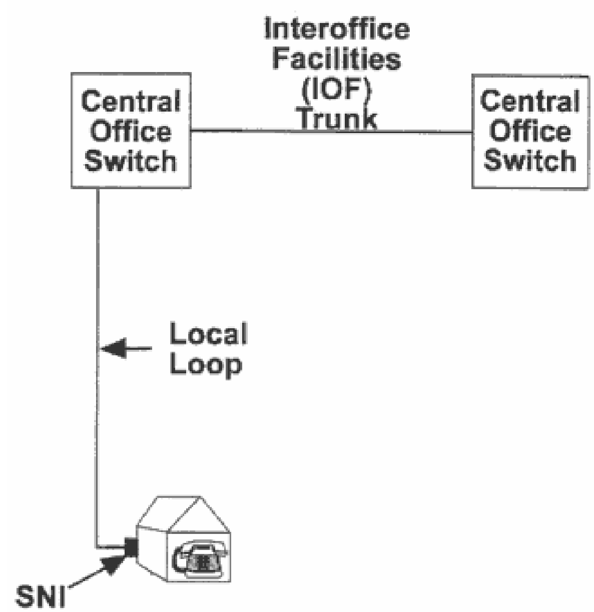


Figure 19 Basic PSTN Network Connections

In a networked situation Central Offices are linked together by switches as is shown in Figure 20 to give the Incumbent Telephony network. [395]

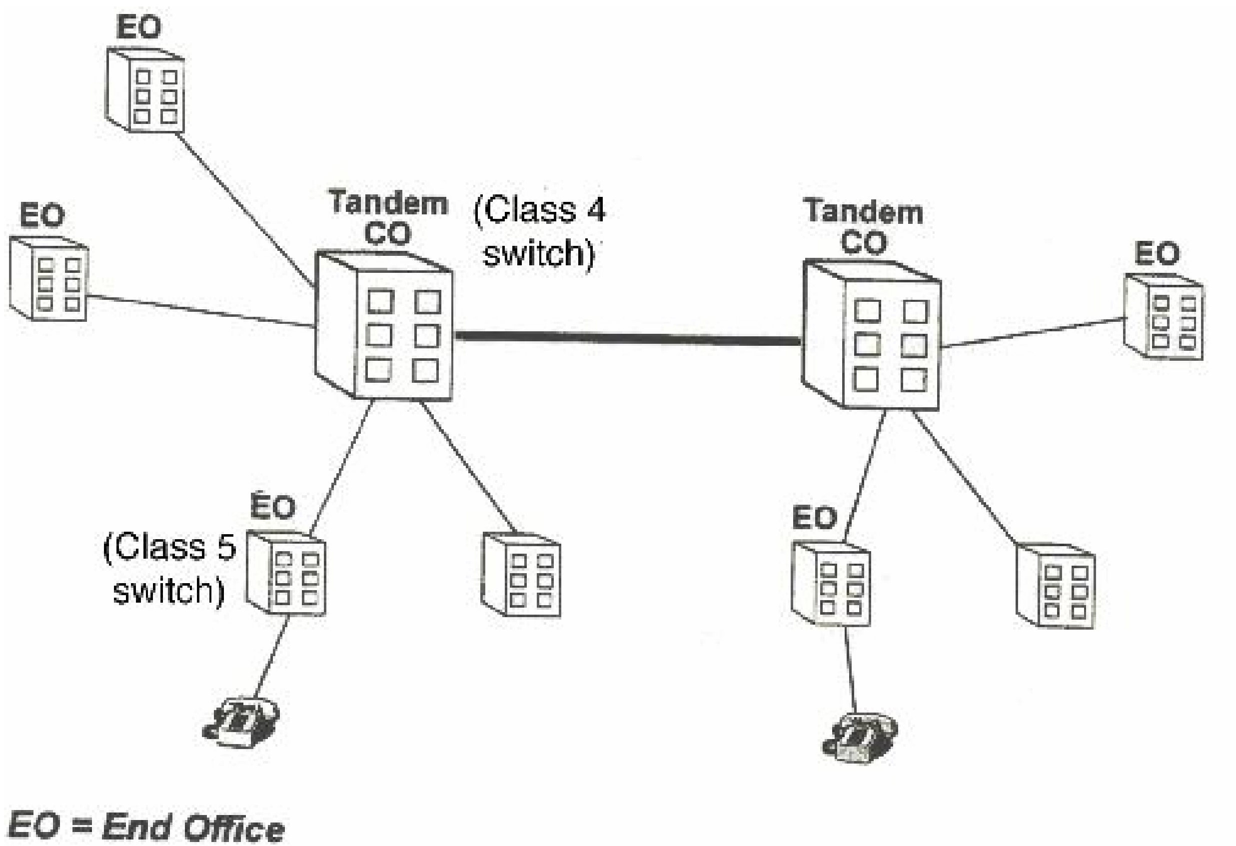
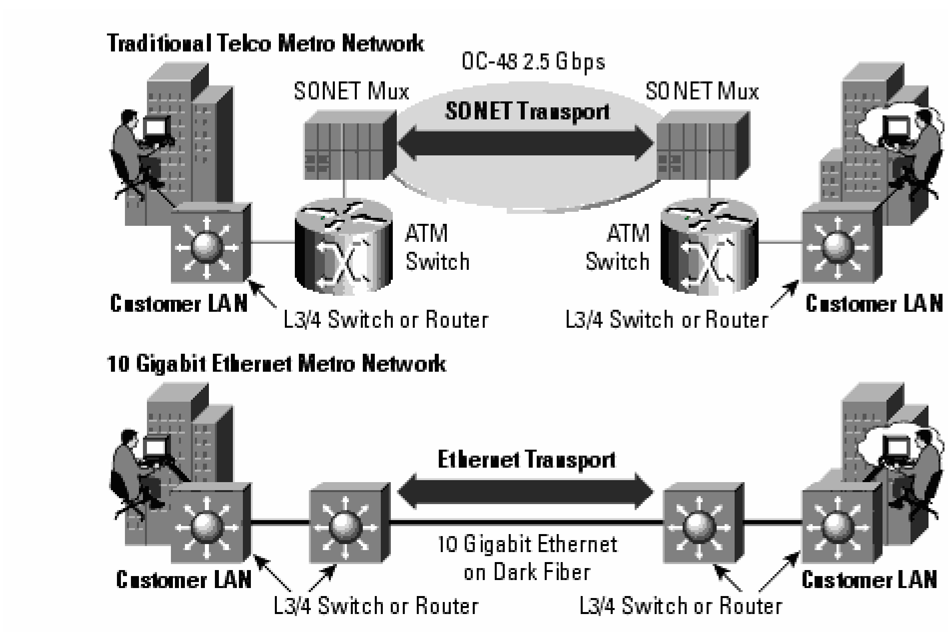


Figure 20 Switching Systems in an Incumbent Telephony Network

Source privateline.com

[395] Telecommunications Fundamental, Figure 1.8, http://www.privateline.com/manual/one.html.

The intelligence that is usually found in the switches in the Central Offices have now become distributed and are found in the intelligent devices in packet networks such as the routers and gatekeepers and gateway devices and other customer premise equipment which are now found on the customers sites. It is these switching and other traditional telecommunications devices that the unbundling regulations of the 1996 ACT made possible. This was further facilitated by the development of technologies that made this movement from the CO to the distributed sites possible.   With these networks elements and the appropriate legal regulations, new distributed entities that use packet switching networks such as Local Area Networks (LAN), Wide Area Networks (WAN) and Metropolitan Area Networks (MAN)   and Enterprise Internet Protocol based Networks were made possible. Figure 21 [396]shows an example of this deployment in a 10 Gigabit Ethernet Metropolitan Network (MAN).



[396] Cisco Systems, Figure 2, http://www.cisco.com/en/US/tech/tk389/tk214/technologies_white_paper09186a0080092958.shtml.

Figure 21 A Distributed Metropolitan Area Network (MAN)

Figure 22 [397] also, shows a spatial dimension of how the switches and other network elements are used in a Wide Area Network (WAN).

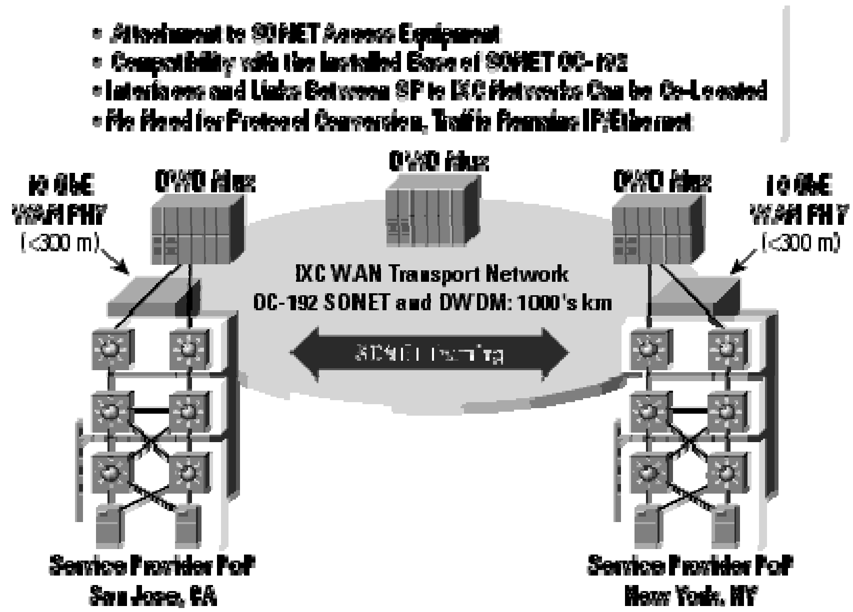


Figure 22 Switches in a Wide Area Architecture (WAN)

Source: Cisco.com

The beauty of the Internet Protocol is that it is flexible and can adapt to different uses. As a result of this it is also used extensively in the Cable industry. Cable Operators are also making use of the plethora of elements the convergence of the Telecommunications Industry provides to offer services other than their original fare of television programming.

[397] Cisco.com, Figure 4, http://www.cisco.com/en/US/tech/tk389/tk214/technologies_white_paper09186a0080092958.shtml.

They now also provide a wide range of Internet as well as other telephony services. One such telephony service is VoIP. Figure 23 shows an example of the technology that is now available to cable operators in the form of Network elements that enables them to do this. This is the same technology that is also available to other competitive LECs as well.

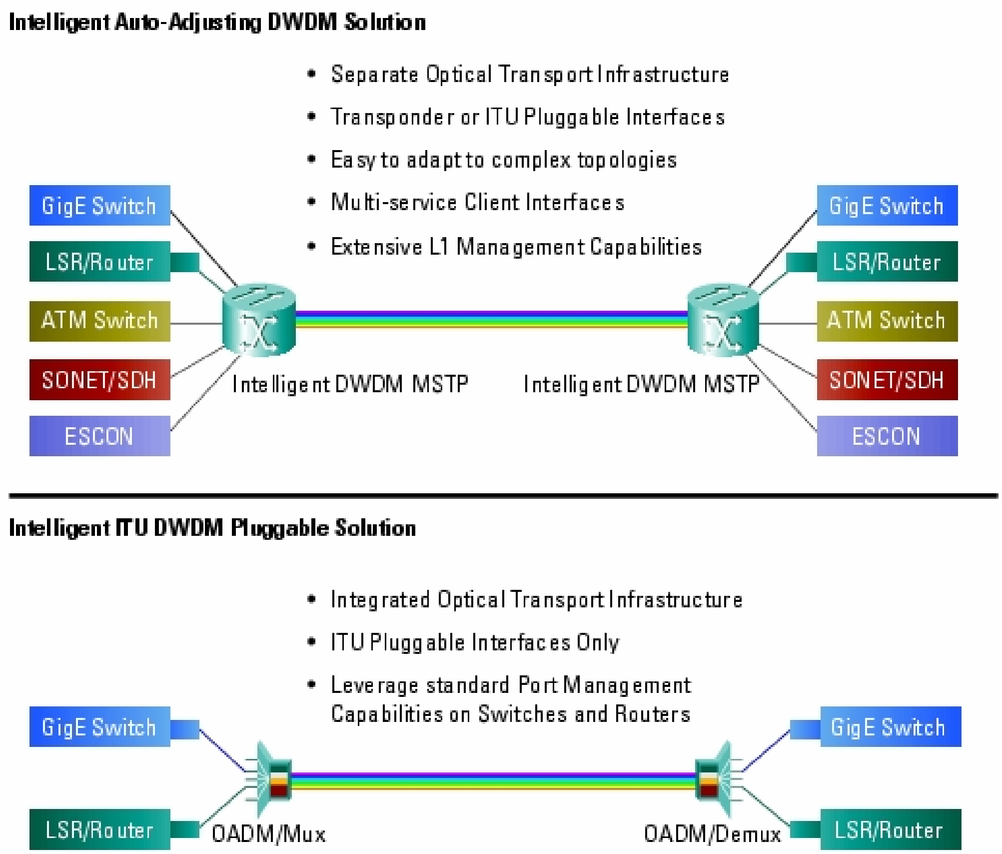


Figure 23[398] Network Elements in a Cable network

In a distributed network, as had been discussed, gateway and gatekeepers, routers and bridges, take up the call switching function of the traditional PSTN. They perform the call set up and routing functions of these networks using Customer Premise Equipment such as PBXs which are part of gatekeeper or gateway devices, thus enabling the same

[398] Cisco Systems, Converged Optical Architectures for Cable Operators, http://www.cisco.com/en/US/netsol/ns341/ns396/ns114/ns422/networking_solutions_white_paper09186a00801f008c.shtml.

things to be done in a distributed mode that the PSTN did centrally. This blending of the traditional PSTN and the newer packet switching elements facilitate information movement between the loops architecture and the newer packet switching networks. Figure 24 [399]shows the locations of Gatekeepers which are traditionally used in H.323 VoIP network. Figure 25[400] shows an example of a network that utilizes gateways for VoIP purposes and its architecture in relations to the PSTN. Gateways are typically used in SIP VoIP networks.

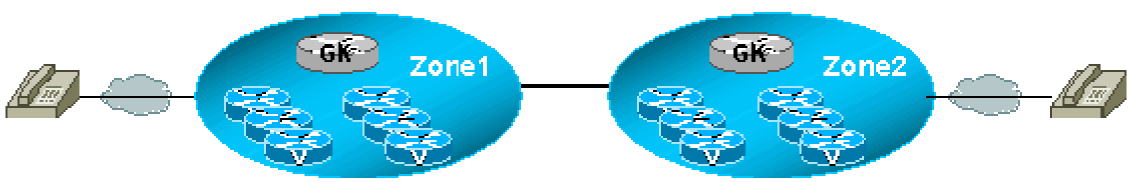


Figure 24 Location of Gatekeepers Zones and Subnets in a VoIP Network

Source: Cisco.com

[399]Cisco Systems, http://www.cisco.com/en/US/tech/tk652/tk701/technologies_tech_note09186a00800c5e0d.shtml#zonesandsubnets.

[400] Nortel.com, http://www.nortel.com/products/01/succession/cs/softswitch/collateral/nn107880-041404.pdf.

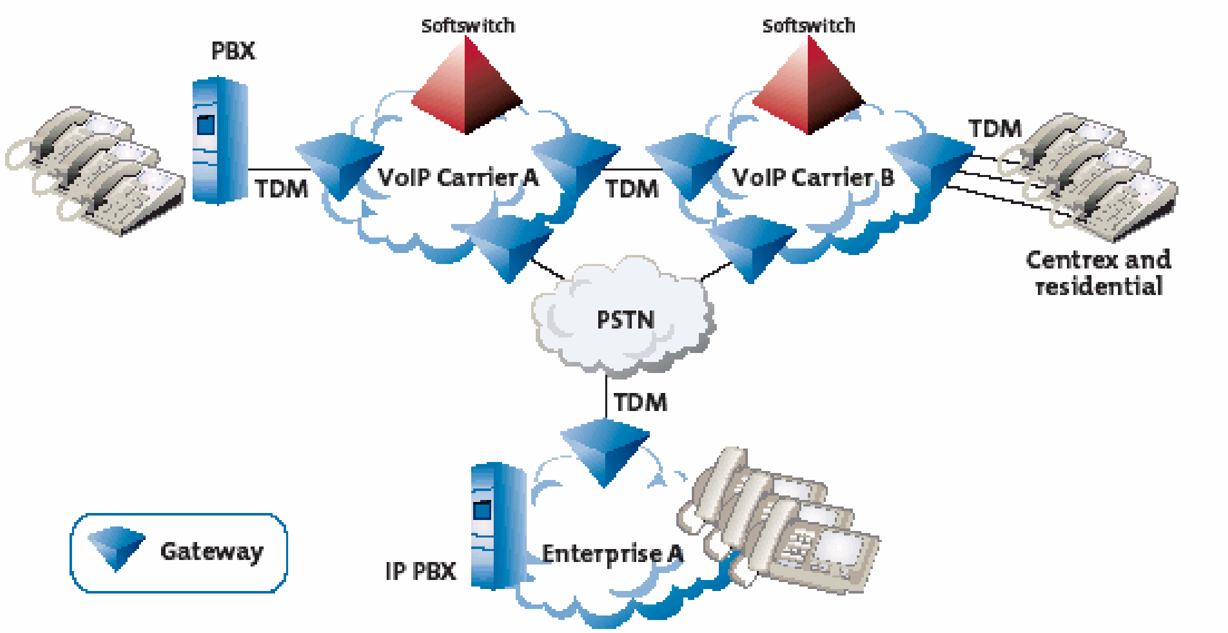


Figure 25 Location of Gateway in a VoIP Network

Source: Nortel.com

Figure 26,[401] shows the Gatekeeper devices – the network elements and the protocols that are used in getting a call from a sender to a receiver in a typical H.323 application.

[401] Cisco Systems, http://www.cisco.com/en/US/tech/tk652/tk701/technologies_tech_note09186a00800c5e0d.shtml#zonesandsubnets.

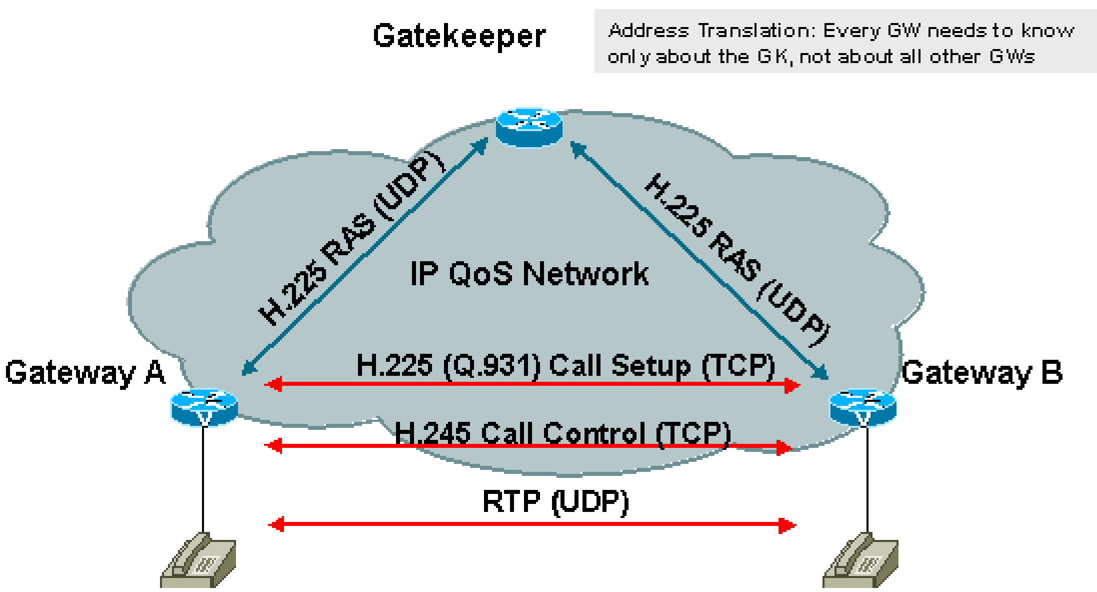


Figure 26 An H.323 Call and Protocols Involved

Source: Cisco.com

Figure 27 [402]shows how gatekeepers and Gateway elements work as switches in the distributed intelligent network environment in making a Gatekeeper to Gateway Intra Zone call set up. In this figure, it shows GK1 as the gatekeeper and GWA and GWB as the gateways. Figure 28[403], shows an inter zone call setup.

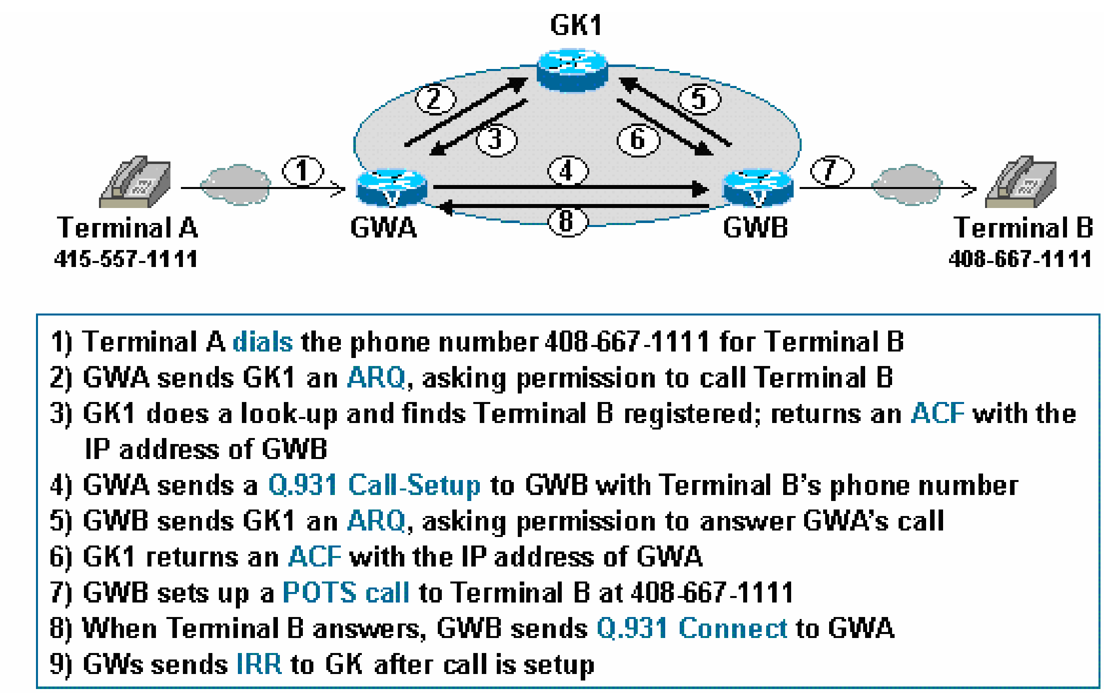


Figure 27 Gate keeper to Gateway – Intra Zone Call Set UP

Source: Cisco.com

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[402] Cisco Sytems, VOIP(Voice over IP) (IP Telehony, Understanding , H.323 Gatekeepers, http://www.cisco.com/en/US/tech/tk652/tk701/technologies_tech_note09186a00800c5e0d.shtml.

[403]Cisco Sytems, VOIP(Voice over IP) (IP Telehony, Understanding , H.323 Gatekeepers, http://www.cisco.com/en/US/tech/tk652/tk701/technologies_tech_note09186a00800c5e0d.shtml.

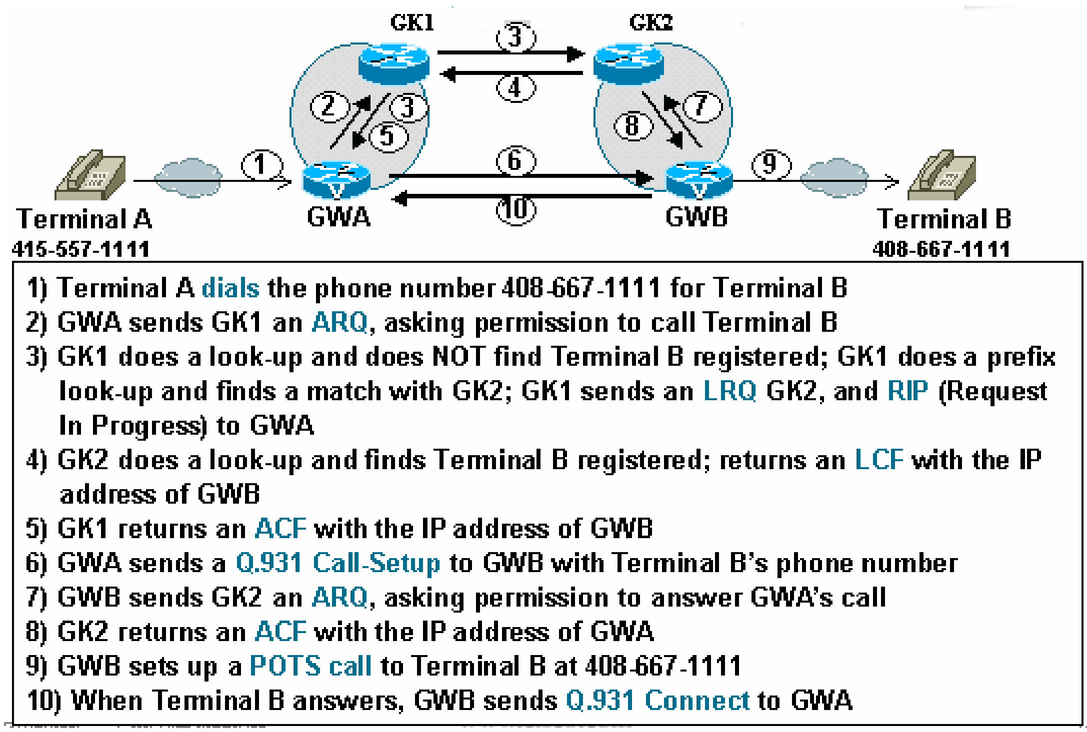

Figure 28 Inter Zone Call setup

Source: Cisco.com

In the same way that switching systems of the central office can be linked together and networked in the same way also can gateways and gatekeepers can also be linked and networked. A representation of the use of these network elements in this manner is seen in Figure 29[404] which shows different ways in which gateway and gatekeeper devices can be connected to give different network plans.

[404] Cisco Sytems, VOIP(Voice over IP) (IP Telehony, Understanding , H.323 Gatekeepers,

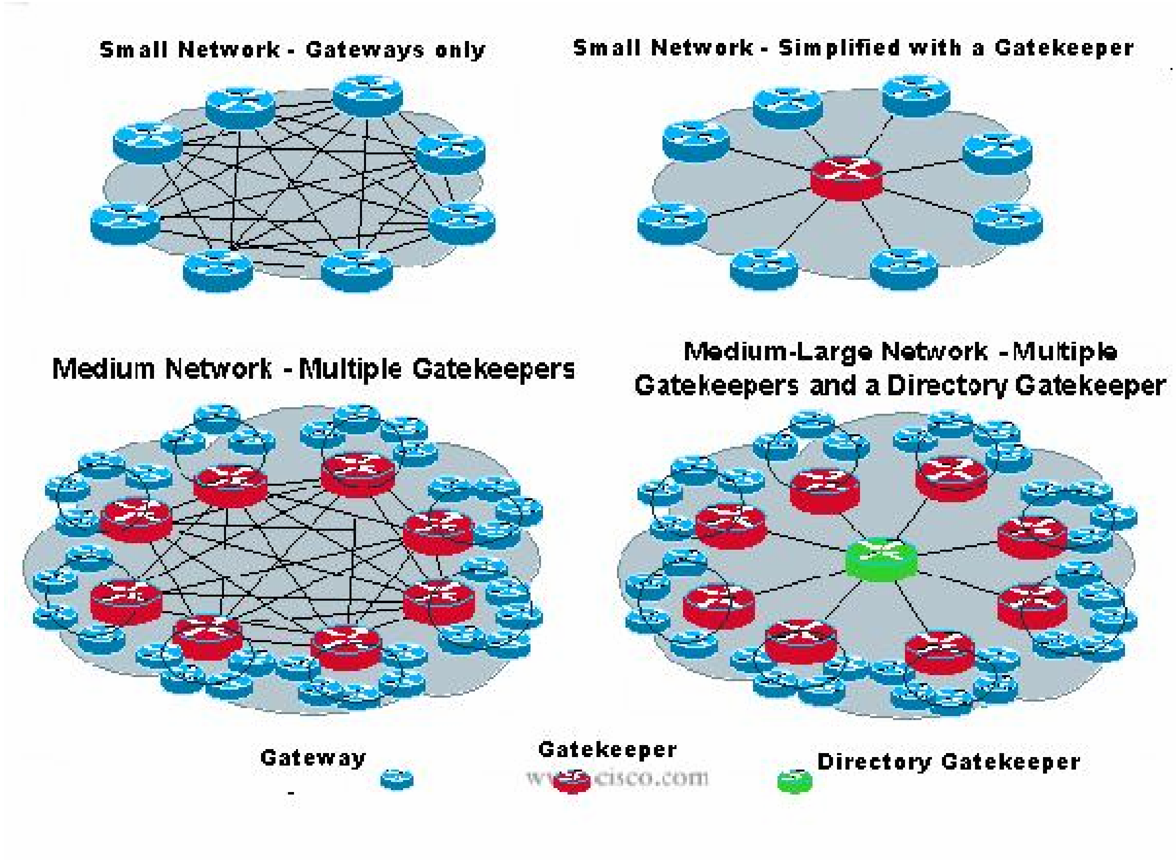

Figure 29 Connecting Gateways and Gatekeepers in Networks

Source: Cisco.com

The above discussion showed the technology that an IP service such as VoIP uses as well as its relationship to loops and networks. What the representation especially the illustration in Figure 26 that used H.323 showed is that VoIP is both a Telecommunications Service and an Information Service. It is a telecommunications services in that it performs traditional telephony services and it is an information service in that it makes use of distributed switches which are found in the gatekeeper devices to

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http://www.cisco.com/en/US/tech/tk652/tk701/technologies_tech_note09186a00800c5e0d.shtml.

do additional things other than telephony. It now adds more features to telephony. Another way of looking at this is that VoIP with its multimedia features now adds dimensions to the perception that voice receives with color and pictures, it gives it a taste, touch and smell dimension. An ensuing problem however that this has precipitated is how should the access to routing information be regulated. First of all of importance here is to note that in using these network devices, VoIP has to use the - "..Capability for the management, control or operation of a telecommunication system.." the Act of 1996 had expressly excluded in its definition of information service in SEC. (3)(a)(2)'(41)[405]. These capabilities are embedded in the network elements and systems.

Also, the FCC had in the triennial report emphasized implicitly that certain services could not be provided without certain access to certain information. One such being the provision of access to routing tables. This is specified in (VI)(D)(3)(434) and the reason the FCC gave for this is that it is of critical importance to the switching technology and that this technology only functions best when access to these tables are provided. However, these are typically capabilities of telecommunication switches that have capability in them for "management and control' of a telecommunications service which the 104th Congress had specifically stipulated in SEC. 3(a)(2)'(41) [406] were not to be available for Information Service Provision. Here however, the FCC is now making available from incumbent to Information Service Providers this feature as a required feature.

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[405] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(41) http://www.fcc.gov/telecom.html.
[406] File s652.3nr, One Hundred Fourth Congress of the United States of America, Telecommunications Act of 1996, SEC. 3(a)(2)'(41), http://www.fcc.gov/telecom.html.

This is again an instance in which the capabilities of the technologies are developed far faster than the laws that affect them can be changed. This then causes uncertainty not only among those implementing the laws for also among those that the laws affect. In this case for example, incumbents had agreed that loops should be unbundled. This is written in the Triennial Report of 2003 in (VI)(A)(2)203), when the FCC noted that:

" … even the incumbent LEC agreed that the loop network element must be unbundled pursuant to section 251(c) (3) and (251)(d)(2) of the ACT."

What is the limiting factor is how this should this be implemented? As a result of this there were no clear polices as to the way that this should be put into operations and it was interpreted differently by different sectors. An incumbent Service provided SBC interpreted it in a manner that prohibited access to the routing table information which according to the 104th Congress' 1996 Telecommunications Act, was what should be done. The FCC disagreed and wrote in the Triennial Report of 2003(VI)(D)(3)(434) that :

" We find no support for SBC assertion that the switch as a network element does not include access to the functionality provided by the incumbent LECS routing table.

The reason for this the FCC continued in (VI)(D)(3)(434) is that[407]:

"…We include access to switch routing tables as a "function" of the switch because one of the most essential functions a switch performs is to provide routing information that sends a call to the appropriate destination. Requiring requesting carriers to engage in the potentially lengthy process of compiling traffics studies and populating routing tables with data in the incumbent LEC's would deny a requesting carrier meaningful access to unbundled local circuit switching to serve customers

The FCC is seen acknowledging here that routing tables are part of gatekeeper's/gateways intelligent functions and that this is part of the intelligence of a

[407] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147,(VI) (D)(3)(434), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

network from an enhanced service or informational service perspective. Furthermore, the features of a routing table are an integral aspect of the switch network element. However, this is a feature that is traditionally associated with basic telecommunications services management which the 104th Congress had expressly excluded from being unbundled. Here though, it is here being described by the FCC as a kind of enhanced not management function which necessitates it becoming unbundled. The thing is that both sides of this issue have a pertinent and valid argument. The technology is such that for it to function properly those who are using it from an unbundled point of view need access to the information in the routing tables to manage their client activities and this is line with the FCC's arguments. The other side of this is that SBC has other clients which are varied and which have different network information all of which are stored in the main routing tables. To make the network information of all the clients it has available to each other would not be an efficient and safe network practice policy for SBC to take part in. However, this is something that can currently be rectified and solved as SBC can make available to a client that requests it the information and routing table information that pertains to that client alone while keeping safe the privacy of others that is serves. Another inconsistency that the law causes as it defines services has to do with packet switches. This will be looked at from the perceptive of information services and telecommunications structure that I have been using.

Packet Switches

Regarding packet switching – the commission wrote in (VI)(G)(1) (541)[408]:

"Finally, because packet switching is used in the provision of broadband services, our decision not to unbundled stand-alone packet switching is also guarded by the goals of,

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[408] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(G)(1)(541), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

and our obligations under, section 706 of the 1996 Act. In order to ensure that both incumbent LECs and competitive LECs retain sufficient incentives to invest in and deploy broadband infrastructure, such as packet switches, we find that requiring no unbundling best serves our statutorily-required goal. Thus, we decline to require unbundling on a national basis for stand-alone switching because it is the type of equipment used in the delivery of broadband."

With regard to this ruling, this again highlights the dilemma the FCC faces as it really tries to work with the emerging technologies. There is no doubt that the costs of deploying fiber lines are of vast magnitude and run in the billions. Furthermore there can not be any argument that investors need to recoup such huge monetary and other resources investments such as their time. However, with the law as it is, it leaves door wide open for a whole lot of legal proceedings that will tie up not only the courts but also prevent fast and effective services deployment for consumers in the USA especially.

This is because by first of all, by stating that it is allowing switches to be unbundled and also allowing access to routing tables as discussed in the last chapter, the FCC is again implicitly stating that it is allowing an open access to use of 'all' network elements. Broadband services uses intelligence in the medium to allow faster telecommunication connections and this is extremely essential for services such as VoIP and other bandwidth intensive applications. To remain competitive not only locally but also nationally and internationally in the services they make available, the competitive service providers will definitely need access to this feature. When the medium was thought of as distinct from the services and intelligence of the network, then such a distinction as to what can be withheld was applicable. However, as has been shown in the analysis, with the convergence which is now occurring these differentiations are no longer valid. By withholding switches to broad band is again in the mode of telecommunications services versus information services and these are no longer valid.

Signaling

Signaling issues also show an inconsistency. Regarding Signaling the Commission wrote in (VI)(G)(2)(545) of the Triennial Report[409]:

"We conclude that, in the last several yeas, the market for signaling networks has matured. The record reflects that multiple alternative providers are available to provide rival signaling services to competitive LECs. Accordingly, we conclude that, as a general matter, competitive LECs are no longer impaired without access to the incumbent LECs signaling networks as a UNE. In performing our impairment analysis, we consider whether barriers exist for a competitive LEC to serve customers through either deploying its own signaling network or by purchasing signaling from alternative providers to the incumbent LEC. We determine that no such barriers exist. "

It also wrote in (VI)(G)(2) (546) the following conclusion[410]:

" Consistent with this analysis, we reject the claims of competitive carriers that signaling networks should remain available as UNEs. .."

In this case, the FCC is right in noting that there are markets for alternative signaling services. However, these signaling services also do have to have a connection at some point to the network of the provider of the local loop. Given that this is the case, in this instance, what is in actuality happening is that there is a market being created for a 'middle competitive vendor", that will integrate with the Incumbent LECs devices. If it is the FCC's policy goal to create such middle markets then this is in line with that goal. However if this is not the policy aim, then what this means from a technical and efficiency point of view is that the competitive LECs are actually correct to ask for access to the signaling networks of the Incumbents and this request was in line with the rulings of unbundling that the 104th Congress had made. The argument for this is similar to the

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[409] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(G)(2)(545), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.
[410] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(G)(2)(546), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

reasoning the FCC had given for routing tables. Signals are an essential feature of switch operations. The rationale for having it unbundled means that it will engender a type of standardization in the industry that would serve the industry well at this time of unbridled growth. This standardization would not necessarily limit innovation as these are already determined by the global telecommunication and Internet activities. It would however show an early participatory role in the outcomes of this feature by the FCC. However, by not allowing this access now, in this instance, it does not show an inconsistency that exists in the rules as such but a myopia that may end up in the future causing problems.

Call-Related Databases

This is another area in the present rules give a perception of an inconsistency. In the Telephone Numbers Portability Ruling of 1996, in Appendix B (52.3)(b) the FCC had stated:

"All LECs must provide a long-term data base method for number portability in the 100 largest Metropolitan statistical Areas(MSA) by December 31, 1998.." [411]

Also, the FCC has mandated that all wireless carriers must implement numbers portability by November 24, 2003[412] and that service providers must by May 4, 2004offer a wire-to-wireless portability for the 100 largest metropolitan areas in the United

[411] Fcc.gov, In the Matter of Telephone Number Portability, CC Docket No 95-116, Appendix B, (52.3)(b), http://www.fcc.gov/Bureaus/Common_Carrier/Orders/1996/fcc96286.txt.
[412]Searchnetworkin.techtarget.com, Local Number portability, http://www.searchnetworking.techtarget.com/sDefinition/0,,sid40_gci934059,00.html.

States.[413] However in in the Triennial Report, of 2003, the FCC rescinded its 1996 ruling and wrote in (VI)(H)(555)[414]:

".. We similarly find that carriers are not impaired without access to the Toll Free Calling and LNP databases

The FCC also in the Triennial Report, wrote in (VI)(H)(556)[415]:

"…Like the call-related databases discussed above, we conclude that the market for AIN platform and architecture has matured since the Commission adopted the UNE Remand Order and we no longer find that competitive LECs are impaired without unbundled access to those databases."

And in (VI)(H)(558)[416] that:

"We reject competitive LECs assertions that, we should require in this proceeding unbundling access to the incumbent LEC databases for bulk transfer of information for competitive carriers to maintain their own call-related databases".

Furthermore It also stated in (VI)(H)(560) that:[417]

We also reject the arguments of some parties that we should require incumbent LECs to provide unbundled access to Operator Services and Directory Assistance(OS/DA)contrary to the Commission's findings that there was no impairment in the UNE Remand Order."

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[413] Local Number portability, http://www.searchnetworking.techtarget.com/sDefinition/0,,sid40_gci934059,00.html.

[414] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(H)(555) , http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[415] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(H)(555) , http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[416] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(H)(555) , http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[417] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VI)(H)(560) , http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

Before looking at the inconsistency in the law, some brief explanations are needed. starting with Local Number Portability (LNP). LNP is a:

"circuit –switched network capability which allows an end-user to change Service Provider (SP), location, and/or service type without having to change their telephone number."[418]

The provision for numbers portability was defined in the Communication Act of 1996 as:

"The ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers without impairment of quality, reliability or convenience when switching from one telecommunications carrier to another."[419]

The technology behind Service Provider portability is the Location Routing Number (LRN) method. LRN is an intelligent network capability that is installed in Local Service Provider (LSP) networks. [420] In an LNP capable network, the components that are required are:

A service Switching Point (SSP)

A Signal Transfer Point (STP)

A Service Control Point (SCP)

Local Service Management System(LSMS)/Service Order Administration(SOA). These intelligent network elements are shown in Figure 30.

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[418] LNP Primer, (Number portability), http://www.ported.com/midlnp.htm.
[419] FCC, In the Matter of Telephone Number Portability, CC Docket No 95-116, http://www.fcc.gov/Bureaus/Common_Carrier/Orders/1996/fcc96286.txt.
[420] LNP Primer, (Number portability), http://www.ported.com/midlnp.htm.

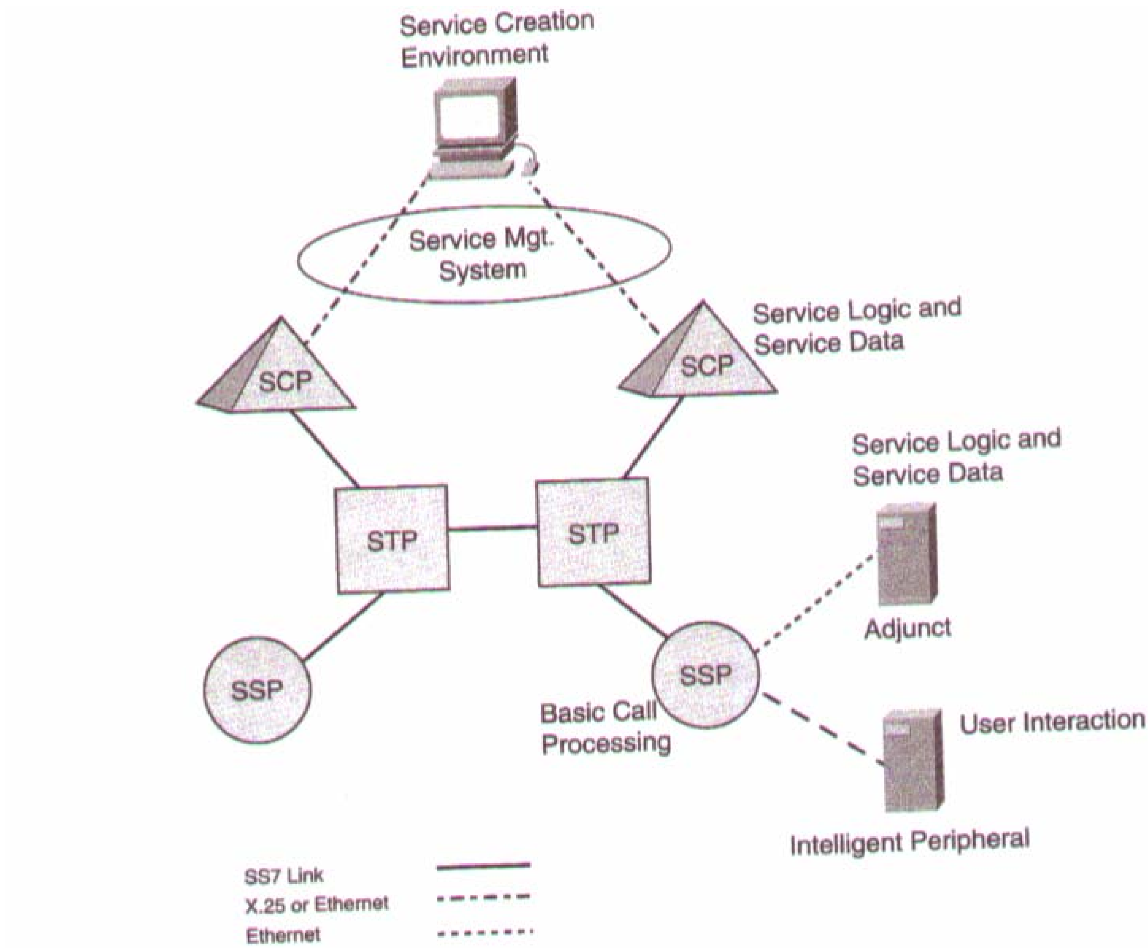

Figure 30 Intelligent Network Elements for Service Portability

Source: Dryburgh

LRN assign a unique 10-digit telephone number to switches and this number serves as the network address of the switch. It is the LRN that is searched when a call is routed from one carrier to another in search of an end user that has changed service providers. A user is noted as portable in the switch when its Numbering Plan Area –Exchange

Code (NPA-NXX)[421] is marked portable.[422] NPA-NXX is part of the North American Numbering Plan (NANP).[423] Figure 31 [424]shows an example of a LRN call Flow

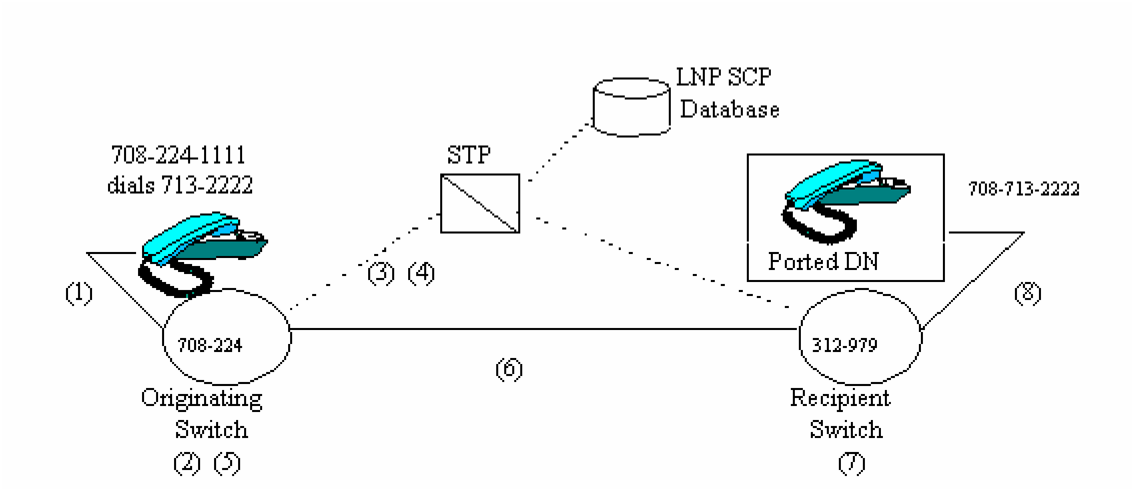

Figure 31 LRN Call Flow

Source: ported.com

The inconsistency that is shown in the law regarding numbers portability is that the changing of telephone numbers is not a static one time fixed thing. This is something that is always going on as people change locations and service providers. This requires information during call processing to find out which exact switch a particular user is now connected with. The number portability ruling of 1996, recognized this. However by rescinding this access it had made available to competitive LEC, the FCC is taking the issue of portability back to where it was before it was unbundled.

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[421] Wits2001, Glossary, Definition of terms, http://wits2001.com/pdf/cg6_glossary.pdf.
[422] Ported.com, LNP Primer, (Number portability), http://www.ported.com/midlnp.htm.
[423] Ported.com, LNP Primer, (Number portability), http://www.ported.com/midlnp.htm.
[424] Ported.com, LNP Primer, (Number portability), http://www.ported.com/midlnp.htm.

Some may argue that the reason for the 2003 decision is that the FCC has moved the servicing of these numbers to a third party company Lockheed Martin as the Number Portability Administration Center. [425] With Lockheed Martin handling this service the argument would be that there is no reason for access to the actual routing tables of the incumbent service providers as the needed information can be obtained from Lockheed martin. This argument will be a valid one if this portability center has in addition to the numbers that has been ported or changed all the other routing tables information. If they do not then the FCC itself may be giving the Telecommunications Industry crossed signals. This is because it had allowed the competitive LECs access to switches but it is seen here denying them access to the information that the switches need in order to operate.

In the Triennial Report in (VI)(D)(3)(434), The FCC had noted that:[426]:

"…We include access to switch routing tables as a "function" of the switch because one of the most essential functions a switch performs is to provide routing information that sends a call to the appropriate destination. Requiring requesting carriers to engage in the potentially lengthy process of compiling traffics studies and populating routing tables with data in the incumbent LEC's would deny a requesting carrier meaningful access to unbundled local circuit switching to serve customers"

If the FCC is going to be unbundling the switches, then it has to for efficiency purposes also unbundled the functions that go with the switches for it to be an efficient rule. In this instance the FCC is doing a partial unbundling of the network and the features of the

[425] Local Number portability, http://www.searchnetworking.techtarget.com/sDefinition/0,,sid40_gci934059,00.html.

[426] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147,(VI) (D)(3)(434), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

devices that contribute to the total efficient flow of information. From a technological perspective this is not an efficient method of rule formulation especially when the information that is being withheld is an important one. Closely associated with this issue is the related issue of non metropolitan areas number portability that had not been addressed.

The FCC has made decisions for portability in metropolitan area only. However, there are non metropolitan areas that increasingly use this technology and who may get affected by the unavailability of this service in their areas. In this instance there has to be a method of finding a way of offsetting the cost of making this service available in non metropolitan areas. Closely related to this discussion is the fact that currently, there is not a directory for some cellular serviced phones. Furthermore, there is no provision for universal services for those using some of these services. A way that the FCC can collect revenue in this area is to create a public directory of currently unlisted numbers and charge a minimum tax charge for this service. Those who do not wish to have their numbers listed can be charged a fee. This fee will go towards the upkeep of universal services. Increasingly as VoIP becomes the normal way of making calls, this is going to be something that will become very important as there is going to be the need to have a service that can search and locate the telephone numbers of both VoIP and Wireless customers.

Operation Support System (OSS)

Another perceived inconsistency in the laws can be seen in the OSS regulations.

Regarding OSS the FCC ruled in the Triennial Report in (VI) (I)(2 the following[427]:

"… OSS as consisting of five functions: preordering, ordering, provisioning, maintenance and repair, and billing functions supported by an incumbent LECs databases and information. … we find that competitive LECs are impaired without access to incumbent LECs' OSS…

The FCC wrote concerning OSS in (VI) (I)(2) of the Triennial Report of 2003, the following:

"…We therefore adopt and unbundling requirement for OSS functions on a national basis."

To see if the ruling is valid, the following discussion presents a brief looks at OSS in the Cellular Networks. I will use the example of cellular networks to show the problems that are associated with OSS ruling. Currently cellular networks are proprietary.

Cellular (GSM) Networks

The most popular digital cellular network is the Global Systems for Mobile communications (GSM). GSM uses Base Station subsystem Application (BSSAP) and Mobile Application Part protocols. Currently there are over 509 GSM networks world wide with over 684.2 million subscribers[428]. These utilize Digital Cellular Systems DCS 1800 and Personal Communications Systems PCS 1900 as well as GSM. DSM

[427] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147,(VI) (I)(2),) http://www/fcc/gov/Daily_Releases?Daily_Business/2003/db0821/FCC-03-36A1.pdf

[428] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p361, Cisco Press, 2005.

translates and transmits at 1900 MHz, PCS at 1900 MHz while GSM translates at 900 MHz[429].

The GSM [430]architecture is divided into three broad functional areas which are the Base Station Subsystem (BSS), The Network and switching subsystem(NSS) and the Operations Support Subsystem (OSS). The BSS is made up of the Base Transceiver Station(BTS) and the Base Station Controller(BSC). The BSS allows transmission to occur between the Mobile Stations(MS) and the NSS. The BTS slows the connection between the cellular network and the MS through the Air interface.[431](p370) The NSS contains the intelligent devices and Dryburg (2005) characterizes it as the Brain of the GSM network.[432] The NSS contains the Mobile Switching Centre(MSC), the Home Location Register(HLR), the Visitor Location Register (VLR), the Equipment Identity Register(ELR) and the Authentication Center (AuC). The VLR contains the subscriber database and takes care of roaming when a subscriber moves to a new MSC. ELR contains a database of valid mobile equipment that can be used on the network as well as recognizes lost SIMs.[433] The OSS contains the intelligence that is used for remote as well as centralized operation, administration and maintenance tasks. **The OSS is proprietary and does not have standard interfaces.** This is one of the problems of OSS. As different vendors provide this capability for different networks, the problem of interconnectivity may ensue. Figure 32 shows a General GSM Architecture with the

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[429] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p 361, Cisco Press, 2005.
[430] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p361, Cisco Press, 2005
[431] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p361, Cisco Press, 2005.
[432] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p361, Cisco Press, 2005.
[433] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p361, Cisco Press, 2005.

three main parts of the cellular network. This network parts and elements as have been shown are similar to those that are found in intelligent networks in the gatekeeper and gateway devices.

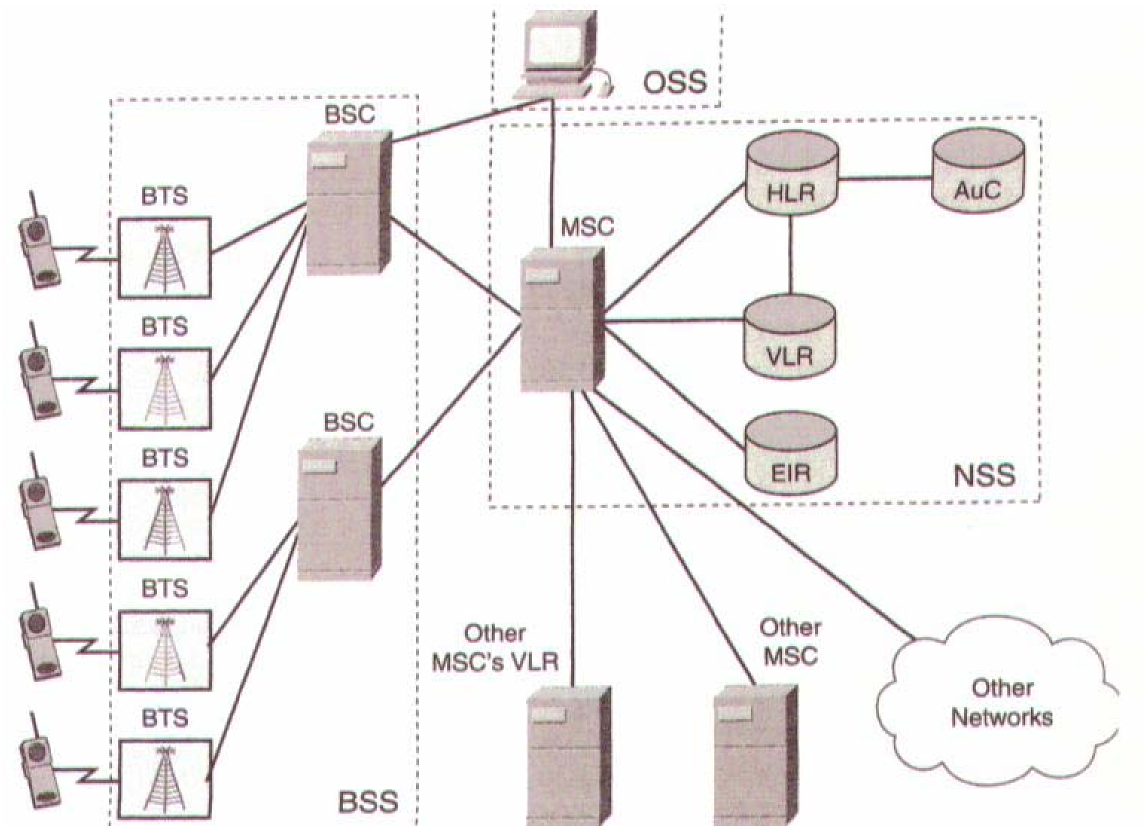

Figure 32 the Main Parts of a Cellular Network

Data is transmitted over cellular networks using PCMIA cards or with handsets known as MS to access a Public Land Mobile Network. Each MS has an International Mobile Equipment Identity (IMEI) which is a unique Number that is stored on it. Each MS also has a Type Approval Code (TAC) which tells the country that approved the phone and a Final Assembly Code (FAC) which tell of the factory such as Motorola, Sony Nokia or Siemens to name a few where the phone was made. Each serial number of an MS has both a FAC and a TAC in addition to the unique serial number. MSs use a SIM card that can be exchanged between Mobile Equipment (ME)

Furthermore in a Cellular network, each subscriber is given a unique number known as the International Mobile Subscriber Identity (ISMI) and this is given in protocol GSM 03.03. A Temporary Mobile Subscriber Identity (TMSI) is an alias that is used by VLR to protect the identity of customers. ISMI is similar in function to Server GPRS Support Nodes (SGSN) in General Packet Radio Service (GPRS) networks. In making a call to a subscriber, the caller will use the Mobile Station ISDN Number (MSISDN) and this is the caller directory number.

In terms of protocols used, the physical layer interface is the air interface, MS-BTS which uses radio transmission and MTP1 in SS7/C7 networks. The data link layer that is used in SS7 networks is MTP2. The network layer uses MTP3 while the application layer level functions uses Level 4 protocols. The protocols for functional entities in a cellular network are shown in Figure 33. This figure shows that the elements of the network that are used in this network are similar to those that are found in regular PSTN network and in VoIP networks as well.

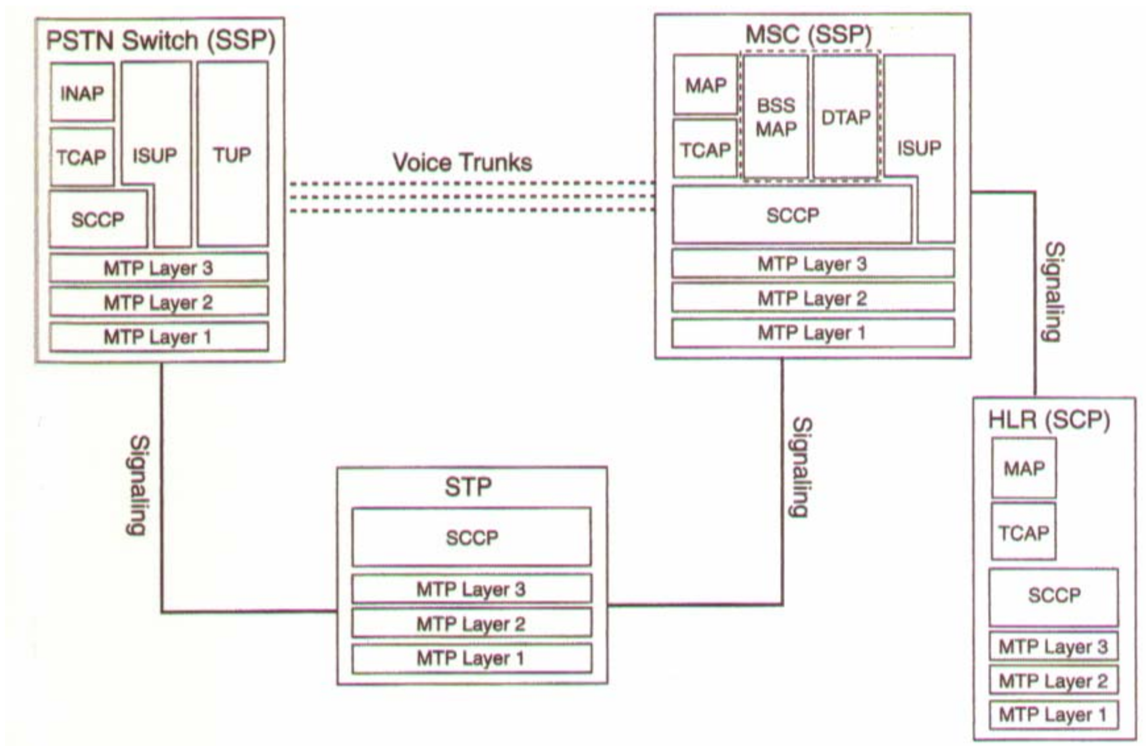

Figure 33 The Protocols used in Cellular Network

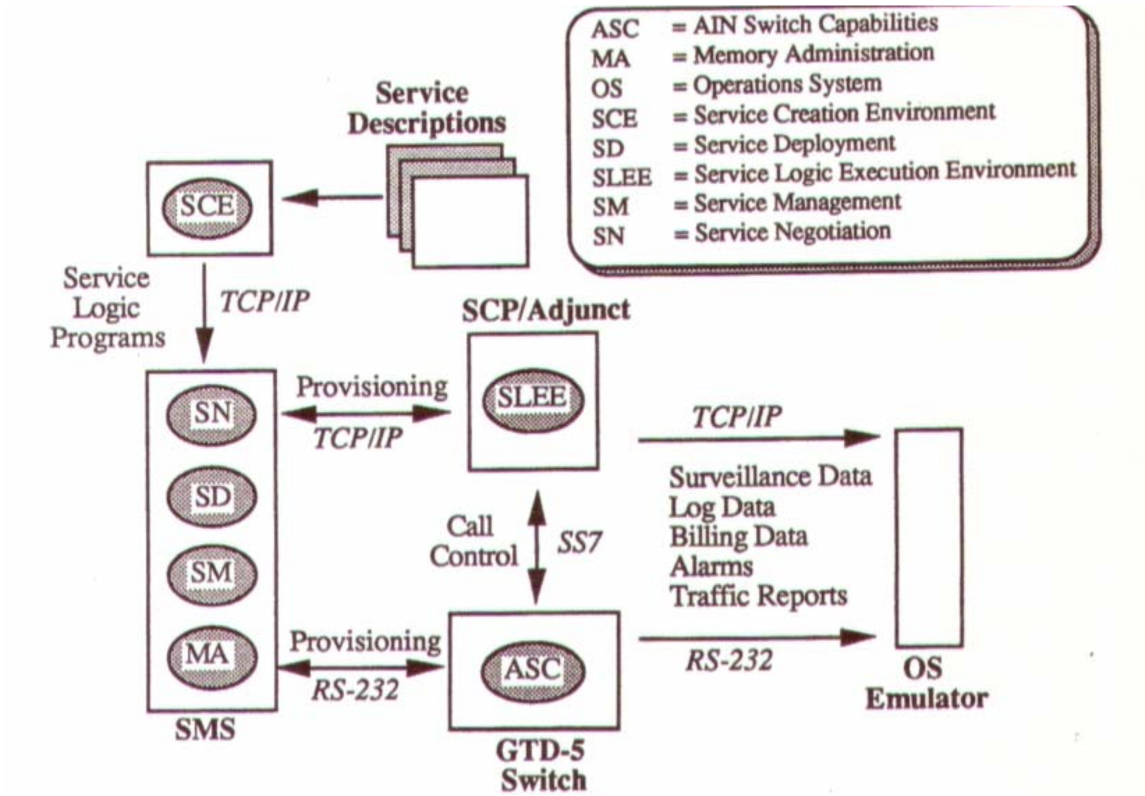

Figure 34 Role of OSS in an Intelligent Network

Source: Bayliss

In this instance, given that the OSS is the means by which a service provider can control and manage the network,[434] this is a network element that competitive LECs should have access to. Furthermore from an efficiency point of view it makes sense to have this identified early in the development of this industry. Figure 34 shows the role the OSS plays in network management. Although the FCC has stated that this is the case, the other rulings that they have made concerning other elements that must not be

[434] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p363, Cisco Press, 2005.

unbundled affect the information that is provided to the OSS. As a result of this, it can be argued that there is an inconsistency in the laws that can result in inefficiencies later on. This inefficiency can be exploited even more because of the fact that OSS is currently proprietary and there are many defined standard for its interface are privately owned.

Enhanced Extended Loops (EELS)

The last inconsistency in the law that this study will look at is that surrounding Enhanced Extended Loops (EELs). Was Total Element Long Range Incremental Cost (TELRIC) incorrectly used by states? This was not the case according to Telecom Policy Report. [435] When the FCC announced a Notice of Proposed Rule Making (NPRM) on this, many felt it was a waste a time as there were no evidence that TELRIC was being incorrectly applied by different states. TELRIC is based on the forward looking cost used by states to set UNE costs. States use this to regulate the wholesale rates for UNE. This intent to regulate was viewed by States as well as CLECs as the FCC looking for a problem where one did not exist. The FCC is seeking to find a formula that is more long ranged than that which the states now use which has to be adjusted periodically every few years. National Association of Regulatory Utility Commissioners (NARUC) has urged the FCC to maintain the present formula which has withstood many court challenges. [436] Among other things NARUC urged the FCC to leave the final discretion on this to the states. Currently the ramifications of this rule making are watched with concern by most in the industry as it has the potential of introducing

[435] Findarticles.com, Telric Proceeding seen as a Solution is search of a nonexistent problem, Telecom Policy Report, December 24th., 2003, http://www.findarticles.com/p/articles/mi_m0PJR/is_36_1/ai_111703781.
[436] Findarticles.com, Telric Proceeding seen as a Solution is search of a nonexistent problem, Telecom Policy Report, December 24th., 2003, http://www.findarticles.com/p/articles/mi_m0PJR/is_36_1/ai_111703781.

anticompetitive behavior with monopoly like prices. Forward looking cost methodology had never been used by the FCC but by the States.

The decision to look at TELRIC came about because of suits filed by US Telecom and Bell companies that challenged the FCC ruling in the 2003 Triennial Report which they contend allowed CLECS to move to TELRIC charges of wholesale priced special access facilities used in long distance charges.[437] The technology that is at the bottom of this contention are Enhanced Extended Loops (EELs). When a CLEC in one location is connected to a particular Central Office (CO) , EELs allow it to have a loop extension from this location to another CO and to clients connected to the other CO location. Essentially then what EELs do is allow two COs in which the CLEC is attached to, to become one extended loop instead of two small loops. It allows CLECS to have access to their residential or business end users from a collocation switch that is in a different area. By the end of 2003, Qwest was offering two configurations of the network that make this possible in 14 states and these configurations are the Point to Point EEL and the Multiplexed EEL configurations.[438] EELs were supposed to be used by CLECS that provided ‘significant’ local exchange services and this ruling had excluded incumbent long distance carriers. However, with the commingling restrictions removed, which the FCC did to prevent CLECS from having two networks – one for local and the other for long distance there is the feeling that incumbent long distance carriers would have a more competitive advantage. [439]

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[437]Glenn Bischoff, Triennial Review: EELs slither into regulatory battlefield, Telephony online, October 6th., 2003
http://telephonyonline.com/access/print/telecom_triennial_review_eels/index.html.
[438]Qwest.com, Enhanced Extended Loop EEL V33.0,
http://www.qwest.com/wholesale/pcat/eel.html.
[439] Glenn Bischoff, Triennial Review: EELs slither into regulatory battlefield, Telephony online, October 6th., 2003,
http://telephonyonline.com/access/print/telecom_triennial_review_eels/index.html .

Some believe EELs also pose problems from both a technical and financial point of view. From the technical point of view some like Bob Blau Vice President of Bell South's Federal Regulations has concerns as this would allow both local and toll traffic over the same facilities and sees problems with 'policing' the different types of traffic.[440] To prevent this type of use the FCC had identified and given three specific requirements by which the term could be defined and reiterated that incumbent LECs must provide to competitive LEC requested UNE in a manner that would allow them to provide a telecommunications service.[441] It thus continued to view EELs as a UNE combination consisting of "unbundled Loops and unbundled transport(with or without multiplexing capabilities) that CLECs are entitled to at 'just reasonable and nondiscriminatory rates terms and conditions. [442] The FCC perceived this as a way to stimulate growth of facilities based competition in the local markets. [443]

With the technologies available it would be easy for the FCC to solve the problem of EELs or special access facilities call by using programs that would manage traffic and also identity both the origin and length of traffic flow over networks. Given that this is the case, toll calls can be identified and billed as such while local calls can also be

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[440] Glenn Bischoff, Triennial Review: EELs slither into regulatory battlefield, Telephony online, October 6th., 2003, http://telephonyonline.com/access/print/telecom_triennial_review_eels/index.html.

[441] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VII)(A)(2)(a)(573), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[442] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VII)(A)(2)(b)(575), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[443] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VII)(A)(2)(b)(576), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

recognized for what they are. The FCC is against this form of pricing however and wrote in (VII)(B)(2)(b) (iv)(613) of the 2003 Triennial Report the following:

> We agree with Cbeyond that measuring minutes for use is antithetical to the Act's goals of encouraging the provisioning [of] new technologies and advanced services, because those usage test could conceivably work only for channelized DS1 providers and would improperly exclude those carriers deploying packetized networks. Classifying and measuring voice traffic separately from data traffic is incompatible with the integration of voice and data in packetized networks and we find that basing our new rules on distinction between voice and data would inhibit this new technology. Moreover, mandating threshold based upon percentages of qualifying traffic would penalize technological advancements in vice compression and have the perverse effect of disqualifying the most effective and innovative deployment of voice technology. [444]

Armed with the desire to carry out the mandate it has been given by the 1996 Telecommunications Act, the FCC is now however in a quandary. This is because employing one type of billing over the other involves large sums of revenue. For example, Verizon communications estimated special access revenue between $168 and $252 million dollars from special access facilities in 2004 and EELS are priced 40% less than special access facilities.[445] Although this does not show an inconsistency in the policy of the FCC, it does show that there are indeed problems that have to be addressed. As more and more competition enters the more lucrative VoIP market, this is an issue that will have to be dealt with again.

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[444] Fcc.com, Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (VII)(B)(2)(b) (iv)(613), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

[445] Glenn Bischoff, Triennial Review: EELs slither into regulatory battlefield, Telephony online, October 6th., 2003, http://telephonyonline.com/access/print/telecom_triennial_review_eels/index.html.

The FCC has noted that by the end of 2005 the IP Telephony market will exceed $3.9 billion for the business IP PBX market and that some CLECs are using EELs to provide services to their business customers.[446] In the 2003 Triennial report, however, the FCC chose not to define IP telephony but wrote " we do not intend to define the regulatory classifications of IP telephony but merely to discuss it use and growth in very broad terms."[447] Although the FCC has the matter of VoIP regulations under considerations, the service is currently viewed as an information service that is not regulated.

In this instance, although FCC has chosen not to use measuring using minutes as a regulatory mechanism, in the end it may be the only equitable way that regulations pertaining to the aspects of the Internet technology can be utilized. Given the similarities of networks and technologies, there has to be a method by which investors can recoup the cost of their investments and this method at least is equitable to both long distance as well as local exchange costs.

What pricing using this method will do, is that it will cause routing tables to use the most efficient method and shortest path routines as well as it will engender innovations in compression technologies that will all contribute to an even better use of IP. In finding an efficient methodology then for the states to bill by looking at TELRIC, the FCC can in this instance be seen as looking at the whole picture of IP and its components rather than just sections of it as it strives to make policies for the next phase of IP technologies.

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[446] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (IV(B)(1)(47,48), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.
[447] Federal Communications Commission, FCC 03-36, CC Docket No. 01-338,CC Docket No. 96-98, CC Docket No, 98-147, (IV(B)(1)(48), http://www.fcc.gov/Daily_Releases/Daily_Business/2003/db0821/FCC-03-36A1.pdf.

This methodology looks at both content and speed. Content can be seen as a factor of the service and speed as that of the line. In this instance then, all the aspects of the technology are used in making a policy and one is not excluded at the expense of the other.

CHAPTER 16

OTHER MATTERS FOR POLICY CONSIDERATION

In the preceding chapters of this study, I have described the specifics some of the new telephony technologies that the Telecommunications Industry uses. I have also discussed the regulatory climate that facilitates the smooth functioning of this industry to ensure its continued growth and I have shown areas in which the language of the law is not clear and can be construed differently and therefore result in some inconsistencies that may affect the efficiency goals of the laws in this regards. These were done to illustrate my thesis point that the vertical and horizontal methods of regulating with regards to the Telecommunications Industry were one and the same.

To do this, I demonstrated that the regulatory factors of this industry such as basic and enhanced services as well as telecommunications and information services were in actuality the same. These were shown to be the case from a technical as well as legal perspective. The Telecommunications Industry however is an intrinsic part of the Internet. With convergence as has been discussed it is hard to separate one from the other as all the functions of this industry now use extensively Internet Protocol technologies. The evolution of this industry to the present state it is in and its relationship to the Internet has been very rapid in the last thirty years with the end of the C20 seeing an unimaginable growth rate. Although telecommunications is regulated, the laws have not specifically touched on the Internet as such in the USA. Services that use the Internet as part of telecommunications processes have been regulated with no direct regulations of the Internet itself as such.

In the coming years what will have to be considered by regulators is what is the Internet and what is its role going to be? Is the terminology “Internet” going to be equivalent to the term telecommunications? – I had in earlier chapters argued for each to maintain their unique identity. On the other hand, is it that the Internet will remain a sub-sector of the Telecommunications Industry? There is no doubt that the Internet as versatile and integrative as it is, still strives to find its place within the domain that the Telecommunications Industry has in place. Even as it emerges as an offshoot of this industry, it oscillates as an overlay of the industry as well as an independent sector with its own identity. This back and forth movement brings with it certain regulatory dilemma among which are what categories should new independent services that it generates become regulated under and what form should the regulation take. These are not easy questions as the innovations that are now taking place are ones unheard off before and they occur at such a rate that the laws are having a difficult time keeping up with them. The thing is that this growth is not going to end any time soon. As the industry continues its growth in what seems like in perpetuity, the foundations for its structure have to be guided by legal principles that will ensure its profitable growth and continued efficiency. What this means is that some of the issues that are related with it right now have to be addressed and some structure should be put in place as to how these and future issues will be handled. To some extent this is now done by some global organizations.

In this section of the paper, I will briefly look at some of the issues that relate to the internet from the perspective of how these affect the 'total' Telecommunications Industry as a whole. Again, this is not a chapter that will analyze Internet regulations as this is not what this study was designed to do.   From this I will look briefly at some of the literature that deals with general issues of the Electromagnetic spectrum. This is a huge topic by itself but it will be looked at briefly as the bits that the Internet and Telecommunication uses are in fact electromagnetic ions. At the end of this chapter, I will make my conclusion. The reason for this unusual layout of this paper was done so as to give each section the consideration that it merited and to have a flow to the paper that allowed the different concepts that were being discussed to be properly discussed and analyzed as they related to each other and to the whole telecommunications policy framework.

Communicating Issues

Communicating is all about allowing the inner thought to be expressed through a medium. Voice is one such medium. Voice is unique in that it acts as a medium as well as content. As a medium it carries the message that must be sent. Speaking is one of the processes that allows voice to be expressed and it is the primary way in which people get their messages across. To get ideas across, in voice for instance, people communicate by exchanging spoken words in a language that is understood by the communicating parties and by this speaking process people deliver the ideas and information that they want to convey to others.

As content, the actual composition and meaning of the message gets transferred. It carries the understanding of what is to be conveyed. The reason of the delivery or the thought of the sender and receiver are made known to each other. Words are used to describe the thought behind the message being sent.

What telecommunications has done is that it has allowed the use of technology to make known the inner thoughts of two people who are not in the same location as though they were. In the case of telephony, voice communication is used in personal, business, political and social forums. Voice communication also plays a big part in broadcasting and entertainment. The voice as a content transport can be used to express emotions and sentiments, the sender intends the receiver to experience. Words and the ways they are spoken can cause the receiver to 'feel' the pain or happiness that is being conveyed. The pitch of the spoken word can incite or pacify those engaged in the listening or hearing process. Vivid, excitedly spoken words not only describe but transport an audience to other places and times so that they could see, imagine, and envision things differently. Spoken words inspire or cause trepidation. Voices and words can conjure up strange flavors so that the receiver can smell some exotic spice or taste the textures and flavors unknown dish. They introduce the listener to new things. Words can weave designs and can create and describe old and new structures. Amorphous and intangible though it is, words, speaking and voice form the bedrock of humanity.

What ever can be spoken can also be written. This is the other side of voice. Once it has been said it can be written or transcribed or recoded. Written text is therefore nothing more than the expressing of the words, or inners thoughts of the sender to the receiver. From a technical perspective, voices can be seen as carrying the routines, procedures and processes a sender uses to describe to a receiver how certain instructions should be carried out. There is no gainsaying then that the voice is an important all inclusive tool. Voice as can be seen above, deals directly with the sound generated by humans. It expresses their inner thought and humanity can imitate and produce almost any sound in nature.

However, there are other sounds that are not human generated. They may have input from humans such as in the production of music that uses musical instrument or the hum of machinery in mechanical or electronic devices. Yet still, there are some sounds that are a part of every day life that enhances the essence of living that humans have no part in their production or generation or. The chirping and calling of birds, the gurgling of streams, the sound of rain, the beating of sea waves are such sounds and even though they are not human generated, the play a big part in human life and are an important part of the 'video' and broadcasting aspect of telecommunications. They add an enhancing quality and like voice, they carry a message across and they help to simplify or enhance the communications process.

At the end of the Twentieth Century, with the addition of the Internet as another outlet for the transport of voice, the Internet joins the ranks of other such media as radio, the telephone, and broadcast Television that assist in simplifying communication while enhancing the quality and utility of life. Although the Telecommunications Industry has been made even richer by the introduction of this technology, as even more opportunities for expressing and improving the quality of life came with this development, it also brought with it newer problems. The Internet caused the older forms of telecommunications entities which had been considered isolated wholes to become 'new' integrated convergent entities with each other. This has necessitated the looking of things from newer and different perspectives and this has brought with it certain issues that require new forms of regulations.

The need for newer regulation types has become one of immense importance. This is because together with the opportunities that the 'improved telecommunications' presents with its many new features there are many more myriad issues and challenges that must be considered when it comes to discussing the present and future place of Telecommunication Industry. This is because it is in communicating that problems and issues occur. In this way telecommunications which facilitates communication with technology, also provide areas of miscommunications. These new miscommunication areas – new issues have to be regulated and directions for dealing with similar related issues have to be provided and implemented as policies. When new means of communicating as well as methods of handling miscommunications are provided, the end result is that this forms the basis for a healthy and growing economy. In this section of the paper I will look at some of the issues this technology.

On-Line Gaming

The On – line Gaming Industry is a new creation of the Internet. This industry will experience a 400% revenue increase with growth from $1 billion to $ 4 billion by 2008.[448] Increasingly, on-line gaming is making use of wireless and mobile devices and this anywhere anytime recreational factor is assisting its growth. By 2009, it is also estimated that this industry will have revenues of $1.8 billion annually.[449] By that same year, about 79 million users will be involved in on-line gaming.[450] One of the issues associated with on-line gaming is that about 8% of the on-line gaming audience are less than 12 years old, while about 15% are teenagers and about 5% are senior citizens over the age of 65 .[451]

Associated with on-line gaming are several issues. First there is the concern for the protection of those making use of these applications from being cheated. There is also the concern for the welfare of children and the elderly who are vulnerable to not only the cheating aspects but also the content that is displayed. As the figures indicate, On-line

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[448] Robyn Greenspan, Online Gaming Revenue to Quadruple, September 7 2004, ClickZ Network, http://www.clickz.com/sats/big_picture/applications/article.php/3409311.

[449] Robyn Greenspan, Online Gaming Revenue to Quadruple, September 7 2004, ClickZ Network, http://www.clickz.com/sats/big_picture/applications/article.php/340931.

[450] Robyn Greenspan, Online Gaming Revenue to Quadruple, September 7 2004, ClickZ Network, http://www.clickz.com/sats/big_picture/applications/article.php/340931.

[451] Robyn Greenspan, Online Gaming Revenue to Quadruple, September 7 2004, ClickZ Network, http://www.clickz.com/sats/big_picture/applications/article.php/340931.

gaming does not only involve the passive playing of games. There is also a lot of revenue involved. At this preliminary stage in the development of this industry, the question is what should be regulated and how should it be done?[452]

Also, there is the issue of on line gambling as it pertains to offshore countries. Although the USA does not allow its nationals to participate in offshore gambling, the world trade organization (WTO) recently ruled this practice an unfair trade barrier[453]. Although this is being appealed, at issue here is how will such offerings become regulated so as to protect the rights of USA citizens in ventures that are virtual should the USA not win its appeal?

SPAM, Viruses and Internet Crime

Spam for the most part is the unauthorized receipt of unsolicited or un-requested on-line advertising that is not aimed at a particular target audience. It is usually sent as email to random addresses or as banner or pop up advertisements to other subscribers with Internet access. Another type of spam is that which is sent by listserv groups and is bulk advertising to those who have requested information on some periodic basis. Spam is defined by its contents which is usually unpleasant in the case of unsolicited advertising as well as by its volume. In 2004 alone, spam volume stayed at about 70% monthly reaching volumes of 85% of distributed content in September of that year. [454] The

[452] Robyn Greenspan, Online Gaming Revenue to Quadruple, September 7 2004, ClickZ Network, http://www.clickz.com/sats/big_picture/applications/article.php/340931.
[453] Nick Farrell, USA must Drop Internet gambling ban, The Inquirer, Thursday November 11 2004, http:/./www.theinquirer.net/?article=19614.
[454] Sean Michael Kerner, The Deadly Duo – Spam and Viruses – September 2004, October 19th., 2004 ClickZ Network, ClickZ Stats, http://www.clickz.com/stats/big_picture/applications/article.php/3420191.

United States was listed by as the top spam producer globally in February 2004[455] as 56% of all global spam originated from the United States of America.

That this is also another area that needs to be studied and guidance provided for is evident from the high spam volume per email addresses that is received. The results of a 6,300 surveyed in a Ponemon and Truste survey revealed that 58% of the respondents were concerned about spam while 37% had concerns over junk mail[456]. The study also showed that 76% and 36 % were concerned about identity theft and telemarketing abuses respectively. In October 2004, in Oregon, a US District Judge, ordered a spam advertiser to refrain from sending out spam mail. The matter was bought to the courts attention by the FTC who had concerns about the spam content that were being sent out. [457] The advertiser used security holes in web browsers of users to track Internet use of subscribers who were later inundated with pop up advertising. He had used this method in the past to send out 30 million such unwanted E-mail daily.[458]

The defense of the advertiser was that there were no guidelines in the law as to what advertising practices are allowed on the Internet even though he wanted to advertise in a lawful manner. Spam is not only limited to computers, it also affects the wireless telephone industry. In wireless telephones, and personal text devices, wireless and mobile telephone spam known as cell phone spam is sent as text messages through the

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455 Robin Greenspan, Spam Origins, The deadly duo, Spam and Viruses, February 2004, ClickZ Newtork, http://www.clickz.com/stats/mrkets/wireless.

456 Robyn, Greenspan, EBay Tops for Trust Among Consumers, Click Z network, http://www.clickz.com/stats/markets/retainling/article.php/3367181.

457 Nick Farrell, Judge Orders Spam King banished, Stop issuing spyware, be-wigged one says, the Inquirer, Monday October 25, 2004, http://www.theinquirer.net/?article=19255.

458 Nick Farrell, Judge Orders Spam King banished, Stop issuing spyware, be-wigged one says, the Inquirer, Monday October 25, 2004, http://www.theinquirer.net/?article=19255.

Short Message Service(SMS) features of these telephony devices. Large volumes of wireless spam can cause frozen screen, as well as initiate the arbitrary dialing of emergency numbers. Since cost are associated with text messages, when large volumes of such messages are sent, the costs can be very high on the affected senders. Some may argue this is also a form of advertising using the wireless telephony technology. Soon this will affect other such telephony technologies such as VoIP as well. The outcome of this may be lost messages, or disconnected messages or even messages that may have random noise attached to them. All of this will end up slowing the communicating process.

As computer users and applications continue to increase there is going to be proportionally rapid increases in the amount of such mail that are sent out. Unless there are specific laws that specify what is considered appropriate advertising methods, this is not a problem that will disappear. The House of Congress of the United States of America has started thinking along the lines of regulating not only spam on the Internet, but also regulating against other actions in Internet crime.[459] In October 2004, the Congress of the United States of America passed a Spy Act H. R. 2929. The SPY Act is the Securely Protect Yourself Against Trespass Act.[460] This Act among other things prevents non-owners from sending to the computers of other users un-requested information or installing software on the computers of others without their permission from a remote location.[461] The Act also, prohibits the collection of information from the

[459] Elizabeth Millard, Enterprise Security , House, passes Anti-Spyware Legislation, October 6 2004, CIO Today, October 25 2004, http://www.cio-today.com/story.xhtml?story_id=27393.
[460] Thomas.loc.gov, Bill Summary & Status for the 108th Congress, H.R. 2929, http://thomas.loc.gov/cgi-bin/bdquery/z?d108:h.r.02929.
[461] Elizabeth Millard, Enterprise Security , House, passes Anti-Spyware Legislation, October 6 2004, CIO Today, October 25 2004, http://www.cio-today.com/story.xhtml?story_id=27393.

keystroke logging functions of authorized computer users, diversion of the Internet web browsers of authorized users without their permission and forbids the collection of personal information such as account information for fraudulent uses.

Although this is a very important first step, this is just the tip of the iceberg. The 2004 Spy Act does not address an essential and crucial question of "What is valid, legal and appropriate advertising on the Internet?" Neither does the Act address or give guidelines within which these advertising could and should be carried.

Furthermore, as it is, the law does not deal with certain other aspects of Internet crime such as data interception or E-mail forgery. Neither does the law present in a cohesive manner the interface between it and other laws that pertain to tort, fraud and contract laws. This is seen in the Effects of Other Laws Section of the Act, where it specifies that the Act does not preempt state laws relating to trespass, contract or tort law and that the Act does not also preempt the laws of the state relating to fraud.[462]

These limitations then ask questions such as - what is contract on the Internet? Can and should the tort laws that have guided traditional ways of doing business be applied to the Internet or should they be changed? If the latter is the case, then what structure should these new changes take? How should these changes be implemented so that businesses and consumers are protected both from a Federal, State and International point of view? These are some of the questions that have to be addressed at the same time as what is not valid , or what cannot be done is addressed. That these are all valid questions as can be seen in the high online fraud incidents reported.

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[462] Bill Summary & Status for the 108th Congress, H.R. 2929, http://thomas.loc.gov/cgi-bin/bdquery/z?d108:h.r.02929:.

Internationally countries and partnering organizations have also been giving this issues some thought. The Council of Europe (COE), ratified in 2001 a convention, that addresses the issues of international computer crime from a multilateral perspective.[463] The language of the document is similar to that of international criminal law. Although the USA is a signatory on the convention documents, this has to be ratified by the USA Senate for it to be binding. Other signatories who are parties to the convention are Canada, Japan and South Africa.[464]

Also, the Asian Pacific Economic Corporation (APEC), in 2003 developed a comprehensive cyber security strategy which addresses mechanisms for dealing with cyber crime among nation members.[465] In 2003, the Organization of American States also drafted at referendum for a draft cyber security strategy among its members.[466]

Nationally, in the USA, in 2003, there were 500,000 complaints filed with the FTC on on-line fraud.[467] This is a reported 40% increase over claims filed in 2002 and Americans

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[463] USdoj.gov, Frequently Asked Questions and Answers, Council of Europe, Convention on Cybercrime, What benefits is this Convention expected to bring for the United States, http://www.usdoj.gov/criminal/cybercrime/COEFAQs.htm.
[464] Frequently Asked Questions and Answers, Council of Europe, Convention on Cybercrime, What role did the Unitd States ply in drafting the Council of Europe Convention, http://www.usdoj.gov/criminal/cybercrime/COEFAQs.htm.
[465] APEC Telecommunications and Information Working Group, 27th, meeting 24-28 March 2003, Kuala Lumpur, Malaysia, e-Security Task Group Minutes, Business Facilitation Steering Group, Doc no: telwg27/BFSG/15 ,B, http://www.apectelwg.org/apecdata/telwg/27tel/bfsg15.htm.
[466]Oas.org, Development of an Inter-American Strategy to Combat threats of Cybersecurity, AG/RES.1939 (XXXIII-O/03), June 10, 2003, http://www.cicte.oas.org/Docs/CyberSecurityConference/BackgroundDocuments/OAS%20General%20Assembly%20Resolution%201939/CYBERSECURITY.doc.
[467] Ryan Naraine, Online Fraud Losses Hit 437 M, January 23, 2004, ClickZ Network, http://www.clickz.com/stats/markets/finances/article.php/5961_3303041.

alone lost over $ 437 million in 2003 to these activities.[468] The dilemma of On-Line Advertising is how it should be allowed to occur while minimizing the spam and fraud issues it is generating. Advertising is a very important and critical aspect of the market economy and advertisements give rise to sales. The internet currently competes with the traditional brick and mortar as well as catalog forms of marketing for sales dollars. Examples of this competition is seen in the first quarter of 2004, where estimated E-commerce Business in the USA alone was $15, 515 billion, this was an increase in of over 273 % over sales figures for the same period in 2001. Businesses carry out sales on the Internet with other business, and with consumers. Also, users as consumers trade with each other in organized trading forums such as eBay as well as informally in listserv forums. Survey results show that E-commerce trade in 2000 was 0.7% of the total retail of the USA but by 2004, this figure has grown to 1.9%.[469] The prediction is that by the end of 2004, online sales would have hit the $144 billion mark which would represent a 27% growth over figures for 2003.[470]

With such phenomenal growth, there was also high instances of online fraud. In 2003, Internet fraud alone accounted for 55% of all reported fraud.[471] Of all frauds reported, Internet auctions affected 48% of all those who complained.[472] This is again another instance that suggests that there should there be some basic guidelines that regulate these trade.

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468 Ryan Naraine, Online Fraud Losses Hit 437 M, January 23, 2004, ClickZ Network, http://www.clickz.com/stats/markets/finances/article.php/5961_3303041.
469 Robyn Greenspan, Click Z Network, Q1 04 U.E.-Com Sales = 15.5B , www.clickz.com/stats/markets/retailing/article.php/3361411.
470 Robyn Greenspan, Click Z Network, Q1 04 U.E.-Com Sales = 15.5B , www.clickz.com/stats/markets/retailing/article.php/3361411.
471 Ryan Naraine, Online Fraud Losses Hit 437 M, January 23, 2004, ClickZ Network, http://www.clickz.com/stats/markets/finances/article.php/5961_3303041.
472 Ryan Naraine, Online Fraud Losses Hit 437 M, January 23, 2004, ClickZ Network, http://www.clickz.com/stats/markets/finances/article.php/5961_3303041.

In the light of these statistics and due to the fact that the current technology that exists does not allow easy detection of spam and virus producers, there is a challenge as to finding out who wants to do legitimate business and who is in the business of perpetrating a crime. Since it does not answer the needs of those who want to do legitimate business and other advertising on the internet, the new Spy Act as it stands may force advertisers to find even more covert methods of getting their advertisement noticed while using technology to hide their identities. Pop ups and banner ads may be very annoying but maybe there might be an innovative way that advertisers of this genre of ads may express what it is that they are trying to sell without causing the problems that they are currently causing. A solution may be that there needs to be created a domain for advertisers and vendors alike where vendors are allowed to display pop up advertisement when these sites are accessed. In this way, users of the internet, know that should they access sites that end with the specified three letter domain ending they will be subjecting themselves and their computers to pop-up and banner advertising.

Dates on Internet Pages

One of the things that I noticed when doing research on the Internet is that although some of the documents had dated information on them, many were however listed with no date so that the authenticity of the documents could be verified by the date. This could cause problems especially to researchers doing work on the internet who would want to use these facts not knowing that they were in fact old and dated information that had been changed. Furthermore, the url listing did not show when the pages were created or modified. To add authenticity and validity to documents on the internet, there has to be a way of getting the date the document was created made available especially in the case of those who are using it for research purposes. This will also assist the content that is posted on the Internet to maintain its creditability.

Ownership of Online Content

When a Marine Corp Reservist died in Iraq, his parents wanted access to the website he had maintained of his activities to continue his work. The E-mail and web hosting provider mailbank.com however, while sympathizing with the family, refused to divulge any information about the account to the grieving family, citing that it was protecting the privacy of is customers.[473] When ISP providers give out the accounts and access to the E-Mail of people who had died to their family, they are regarded by some as violating the privacy of the deceased. On the other hand when they do not give out this information, they are regarded as unfeeling.[474] Official policy varies among E-mail service providers with respect as to how to deal with E-mail of the dead and this is one of the issues that will have to be dealt with by regulators. This is an example of some of the newer challenges to the law that the Internet brings.

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[473] Ariana Eunjun Cha, MSNBC Technology News After death, a fight for digit memories, No clear laws of inheritance cover web data, http://www.msnbc.msn.com/id/6903400/.
[474] Ariana Eunjun Cha, MSNBC Technology News After death, a fight for digit memories, No clear laws of inheritance cover web data, http://www.msnbc.msn.com/id/6903400/.

Pornography on the Internet

In October 2004, the Chinese government closed down 18,000 Internet or I-Cafes because they had made unsuitable sites available to minors. In general, China blocks access to sites that are considered pornographic.[475] In the USA, The USA Congress attempted to protect minor by passing the Child Online Protection Act (COPA) of 1998 which requires proof of age before allowing access to sexually explicit sites.[476] This ruling was contested by the civil liberties organizations including the ACLU and in March 2003, the ruling was found to be unconstitutional.[477] COPA is the successor of The Communications Decency Act (CDA) of 1996, which was declared unconstitutional by the Supreme Court in 1997. [478] With regards to COPA, in 1999, the Court found that commercially available software were available for parents to block sites that they considered unsuitable for their children to watch.[479] In 2003, when this ruling was made Internet access via telephony and video and television access via telephony were not common and the technology was not widely used. However, by 2005, almost every cellular and mobile phone comes with both Internet access as well as access to television stations. These are still very new technologies and as such specific laws have not yet been instituted for their regulation. The issue here is that almost every other teenager has a wireless telephone. Cellular telephone usage among children is not simply restricted to children in urban or metropolitan areas anymore but a wide spread universal use that encompasses rural areas as well. Given that this is the case, children can in this instance become exposed to sites some parents may consider

[475] Wired News, China Cracks Down on I-Cafes, http://www.wired.com/news/business/0,1367,65548,00.html?tw=wn_tophead_6.
[476] NetSafeKids, http://www.nap.edu/netsafekids/pp_li_il.html.
[477] NetSafeKids, http://www.nap.edu/netsafekids/pp_li_il.html.
[478] NetSafeKids, http://www.nap.edu/netsafekids/pp_li_il.html.
[479] Phillipsnizer.com, American Civil Liberties Union, et al. v. Janet Reno, Civ. Act. No. 98-5591 U.S. Dist. Lexis 735(E.D.Pa., Feb.1, 1999), http://www.phillipsnizer.com/library/topics/first_ammendment.cfm.

unsuitable. This is another area that the legal system has to provide some guidance for as well so that the first amendment rights of individuals are protected while at the same time the innocence of minors are considered. It may be that a simple law that requires all Internet access providers on telephony, computers, as well as broadcast television and cable providers to provide parents with a method of blocking unsuitable sites may solve the problem. Parents however, have to be advised that the access that they are purchasing for their children has the capability and it is their right to determine how they want to have the capability managed for the welfare of their children.

Intellectual Property and DMCA

As more and more have access to the internet, issues such as those relating to the use of material created and invented by others have to be addressed. In 2002, the Phonograms and Performance Treaty (WPPT)of the World Intellectual Property Organization (WIPO) went into force. This is a copyright treaty that penalizes those who use technology to break copy protection standards. In the USA, this treaty is implemented by the Digital Millennium Copyright Act(DMCA).[480] It was meant as a facilitating tool in the digital medium that would assist among other things copyright protection.[481] However, some have argued that the Act, does take into consideration among other things instances in which there is a 'valid' reason to circumvent the protection system such as when infringement is suspected and found to be true.

In this case H. R. 2281 - the Digital Millennium Copyright Act in Sec.1201(3)(A) states "To circumvent a technological means to descramble a scrambled work, to decrypt or

[480] Wordiq, WIPO Performances and Phonograms Treaty, http://www.wordiq.com/definition/WIPO_Performances_and_Phonograms_Treaty.
[481] Pamela Samuelson, Intellectual Property and the Digital Economy: Whey the Anti-Circumvention Regulations need to be revised, http://www.sims.berkeley.edu/~pam/papers/Samuelson_IP_gig_ecohtml.htm.

encrypted work, or otherwise to avoid, bypass, remove deactivate or impair a technological measure, **without the authority of the owner**" [482]

The concern in this instance though valid is not grounded in the Law. This is because the law supports the owner as a result of this it can be argued that the owner may engage in the actions listed above when they are the rightful owners of an electronic content. In this case then, the argument can be made that the rightful owner can descramble an encrypted and it is within their right in the Law to do this as is written in the language of the law, especially if it is to confirm that they had been defrauded. In fact, under the Protection of Personally identifying information, (Sec.1201(i)(1)[483], circumvention is permitted under some guidelines.

Data privacy

Although the Council's of Europe's (CoE's) Convention For the Protection of Individuals with Regard to Automatic Processing of Personal Data protects its member states and secures a means of ensuring the privacy and protection of personal data of individuals from these countries[484], such a protection does not exist for the rest of the world. In the USA this is touched on briefly by the SPY Act of 2004. This is an issue that needs to be addressed when policies that will guide the use of the Internet are looked into. In fact,

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[482]Loc.gov, Sec. 1201(3)(A), H.R.2281 Digital Millennium Copyright Act (Enrolled as Agreed to or Passed by Both House and Senate, http://thomas.loc.gov/cgi-bin/query/F?C105:1:./temp~c105LE11ib:e11962:.

[483] Loc.gov, Sec. 1201(i)(1), H.R.2281 Digital Millennium Copyright Act (Enrolled as Agreed to or Passed by Both House and Senate, http://thomas.loc.gov/cgi-bin/query/F?C105:1:./temp~c105LE11ib:e11962:.

[484] Council of Europe: Convention For the Protection of Individuals with Regard to Automatic Processing of Personal Data, Council of Europe European Teaty Series No. 108, Article 7, http://www.privacy.org/pi/intl_orgs/coe/dp_ onention_108.txt.

this issue asks the question what are the human rights, if any that can be generalized to participation in the Internet and cyberspace culture? Looking to the United Nations for answers on this may not be enough. Although The Universal Declaration of Human Rights[485] was adopted on December 10th.,1948 by the United Nations (UN), the global atmosphere and concerns that existed in 1948, are far more different and complex than that which exists now. Technological advances for one did not proliferate as fast then as it does now and this makes for the question, - Globally, should the Declaration of Human Rights be amended to take in these new aspect of societies that are On-line and Internet related into consideration? It would seem this is the case. If this is the case how should the laws be articulated? In the USA, freedom and human rights are protected by the Constitution.

Although Sadosky et al has mentioned Article 12 of the Human Rights Declaration as an example of this treaty that has a "protect" clause, as this declaration stands this may not be enough. One reason for this is that although the language of Article 12 mentions 'arbitrary' attacks, this is not specific enough to handle the reality of the information age technology, of the Internet, or Information networks. The technology that is being created has inherently as part of its make up, loop holes which are the default standards through which authorized as well as unauthorized information gathering can continuously occur. Furthermore, the Declaration of Human Rights even though it mentions many specific aspects of Human Life including the joining of trade unions[486], does not mention anything pertaining to commerce which is a function that is carried on in reality. In the Internet, one of the largest uses of this medium in reality is to facilitate

[485] UN, All human rights for all, Fiftieth Anniversary of the Universal Declaration of Human Rights, 1948-1998,http://www.un.org/Overview/rights.html.
[486] UN, All human rights for all, Fiftieth Anniversary of the Universal Declaration of Human Rights, 1948-1998, Article 23 (4), http://www.un.org/Overview/rights.html.

trade and commerce. Given that this is the case then, the rights of humans to participate in this activity and how it will be protected is something that commerce policies pertaining to the Internet and cyberspace as well as general Human Rights with regards to commerce activities will have to address. In the USA, although this right is covered and protected by the Constitution, precautions will have to be taken that any new regulations regarding aspects of the Internet itself, do not erode these rights.

E-commerce Issues

E-commerce issues run a wide range. They deal with issues pertaining to e-Trade, the online sale of goods and services between businesses (B2B), between businesses and consumers(B2C)and between consumers(C2C). E-commerce also involves and as a result of this embodies issues pertaining to e-Finance which involves among other things online transactions pertaining to online brokerage, banking, insurance, and other financial investments. Another aspect of E-commerce has to do with E-payments. This is use of credit, debit and other forms of online payment transactions mechanism as methods of settling debts. As Internet subscribers increase, E-commerce transactions continue to grow.

For example, 77% of consumers in Britain expect that within the next five years they will use the web to conduct banking transactions while 72% will do so to pay bills. In the United States of America, Nielsen ratings report that online banking services has grown by 80% with current users at 23.1 million as opposed to 13 million in 2001.[487] Though some analyst see this as the success by institutional banks in moving customers from

[487] Finextra, US Web banking grows 80% in two years –Nielsen//NetRatings , 22/09/2003, http://www.finetra.com/fullstory.sap?id=9996.

traditional means of banking[488] to online banking in the USA and in the United Kingdom, this may not be so. [489] By 2020, it is estimated that over 42 million people in the United Kingdom a will be using Internet for their banking needs and this is expected to take away 11 million customers from the major banks in the nation[490]. Given that on-line banking will invariably co-exist with traditional banking processes, regulators have to start thinking of what format this co-existence will take. Will the general laws that pertain to traditional brick and mortar banking structures suffice for the new-online environment? If not, then how and in what format should the new laws take?

Among the issues that pertain to E-commerce is that of security flaws in the banking sites by which hackers and other unauthorized users could access accounts or even bring down banking sites. [491] Security risk range from things such as router and fire wall insecurities[492] in UK tested Web banking facilities.

Also there is the issue of fraud in online banking. In the UK, in the first half of 2003, electronic fraud due to On-Line Banking reported fraud losses of over $150,000 (£100,000) were reported.[493] In South Africa, over R530,000 were stolen from an online account of an Absa's Banking customer[494], while in Hungary, the country's

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[488] Finextra, US Web banking grows 80% in two years –Nielsen//NetRatings , 22/09/2003, http://www.finetra.com/fullstory.sap?id=9996.
[489] Finextra, Britts turn to Web for banking and bill payment, 26/08/2004, http://www.finetra.com/fullstory.sap?id=12401.
[490] Finextra, Rise in Internet banking will hit Big Four A&L, 15/11/2004, http://www.finetra.com/fullstory.sap?id=12845.
[491] Finextra, Basic security flaws put UK Banking sites at risk –NTA Monitor , 20/08/2003 http://www.finetra.com/fullstory.sap?id=9786.
[492] Finextra, Basic security flaws put UK Banking sites at risk –NTA Monitor , 20/08/2003, http://www.finetra.com/fullstory.sap?id=9786.
[493] Finextra, Banking and electronic payments fraud on the rise , 28/07/2003, http://www.finetra.com/fullstory.sap?id=9572.
[494] Finextra, Spyware bank fraud uncovered in US and South Africa , 21/07/2003, http://www.finetra.com/fullstory.sap?id=9511.

leading bank reported that its webpage had been duplicated by hackers in the hopes of diverting funds from their online customer accounts.[495]

To combat this problem, individual financial institutions have implemented different remedies. In the UD for example, the Internet bank Cahoot, has started issuing disposable credit card numbers for online shoppers.[496] This organization claims that it has been able to prevent fraudulent charges in the region of £600.000 in the first half of 2003 using this mechanism.

The issues of E-commerce are not only limited to fraud. The larger issues are that globally there are no standardized methods or policies have been specified to handle problems that pertain to it. Several organizations both nationally within nations and internationally are grappling with how to deal with the myriad of legal and policy issues this new technology present. Internationally, The United Nations Conference on Trade and Development(UNCTAD), has recognized that in developing countries especially, some of the issues that they face in the area of e-commerce especially in E-Financing of Small and Medium Sized Enterprises (SMEs) are costs of website setup, maintenance and technical expertise and provides assistance to them in this regard and the need for enforcing laws when fraud is perpetuated.[497]

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[495] The Budapest Sun Online, Internet banking fraudsters, November 18th., 2004, http://www.budapestsun.com/full_story.asp?ArticleId={B968102A30F445D0B23FBE03E391681B}&From=Business.
[496] Finextra, Disposable card numbers cutting online fraud, says Cahoot, 12/08/2003, http://www.finetra.com/fullstory.sap?id=9710.
[497] Charles Goldfinger, Jean-Christof Perrin, UNCTAD/SDTE/MISC.48 17, October 2001 United Nations Conference on Trade and Development, E-Finance and Small And Medium-Size Enterprises(SMEs) in Developing and Transition Economies, UNCTAD Expert Meeting, Geneva, P18-19, http://www.unctad.org/en/docs//postdtem48.en.pdf.

One of the Issues that the United Nations Commissions on International Trade Laws (UNCITRAL) has decided to address is that pertaining to online contracts and acceptable principles for conducting e-business. In its 44th session in October 2004, the commission was slated to discuss among other issues the following

- A standard instrument for electronic contracting
- Legal barriers to electronic commerce
- Transfer of rights, especially of tangible goods by electronic means.
- Issues of International Commercial Arbitration rules as it pertains to online arbitration.

Of particular interest to the working group was that as they deliberated on providing appropriate policies for an international instrument that dealt with Electronic commerce was that:

"References to "writing", "signature", "document", and other similar provisions in existing uniform law conventional and trade agreements had already created legal obstacles and generated uncertainty in international transactions conducted by electronic means."[498]

This is also an instance in which clarity in definition of terms have to be addressed. This is perhaps one of the biggest challenges that face Internet institutions. Terms that pertain to other non-technical aspects of its workings have to be re-defined in perhaps almost all fields. A whole new set of 'understanding' has to be reached not only for on-line clarifications but also, steps have to be shown as to how, both the online aspects will co-exist with non online and traditional aspects.

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[498] United Nations, General Assembly, United Nations Commission on International Trade Law, Annotated Provisional agenda, para 8, http://ods-dds-ny.un.org/doc/UNDOC/LTD/V04/562/31/PDF/V0456231.pdf?OpenElement.

In the foreseeable future it may be that there will no longer be any need for methods and procedures which are now considered traditional. Until such a time as this consensus is reached, there has to be specific and explicit policies that are enforceable and which are global in scope in the area of international Internet transactions. In the case of the UNCITRAL's policy, It is to be assumed that once these policies are accepted by the members states of the commission that this would become enforceable and binding. The limitation to this is that it may be difficult to enforce these principles once they are developed in developing countries if they already do not have in place national governmental agencies and bodies to handle the implementation of these procedures.

Taxes

Although the Organization for Economic Co-operation and Development (OECD) has structured a Model Tax convention which guides its members on issues pertaining to income, capital taxes and which works at eliminating double taxation, with the Internet these nations face the problems of dealing with tax avoiders and evaders. [499] This is because it is not easy when commerce is conducted over the Internet to find out what the source or residence country is especially when servers and web pages are involved.[500] In a December 22 2000 amendment of it guidelines, OECD defined software and data as not being examples of what constituted a physical establishments

[499] Jönköping International Business, Preface by Jeffrey Owens, Head of OECD Centre for Tax Policy and Administration, Paris, Cross Border Taxation of E-Commerce, http://www.ihh.hj.se/eng/info/news/westberg_owens.htm.

[500] Sandra P. McGill, Lowell D. Yoder, From Storefronts to Servers to service Providers: Stretching the Permanent Establishment Definition to Accommodate New Business Models, VI Adapting the PE concept to E-commerce, A, PE definition Difficult to Apply to E-Commerce Business Model, Page 156, http://www.mwe.com/info/pubs/mcgill-yoder.pdf

for tax purposes even though servers and computers were. [501] Since there is no definite statement on E-commerce, several countries are using their own national laws to modify their understanding of the Model Tax Convention with respect to the Internet and taxes. Furthermore, advocates contend that digitized goods should not be subject to consumptions taxes and should not be regarded as goods being supplied.[502] With the growth of the internet, the decision not to subject digitized products to taxation policies is going to cause a lot of problems later on for many countries.

In 2000, when the Model Tax Convention Modifications to Article 5 was adopted to include E-Commerce, by OECD members, this may not have been a pressing issue. However, by the year 2004, this may not be the case. In the Q4 of 2004, for example Apple Computer's IPod music players helped apple to attain its highest revenue in nine years of over 2.35 billion dollars.[503] During the same period iPod growth increased by over 500%.[504] Given that musical and video down load equipments such as the iPod and the down load of music itself is of an electronic nature with billions in revenue yearly, this bring some urgency into the discussion of taxes on the Internet and the nature of taxed and taxable goods and what new mechanism, if any should be added or modified to the OECD model and how best it could be made equitable from an international

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[501] Sandra P. McGill, Lowell D. Yoder, From Storefronts to Servers to service Providers: Stretching the Permanent Establishment Definition to Accommodate New Business Models, VI Adapting the PE concept to E-commerce, A, PE definition Difficult to Apply to E-Commerce Business Model, Page 157, http://www.mwe.com/info/pubs/mcgill-yoder.pdf.

[502] Jönköping International Business, Preface by Jeffrey Owens, Head of OECD Centre for Tax Policy and Administration, Paris, Cross Border Taxation of E-Commerce, http://www.ihh.hj.se/eng/info/news/westberg_owens.htm.

[503]ComputerWeekly.com Apple posts highest Q4revenue in almost a decade, Thursday 14 October 2004. http://www.computerweekly.com/Article134231.htm.

[504] ComputerWeekly.com Apple posts highest Q4revenue in almost a decade, Thursday 14 October 2004. http://www.computerweekly.com/Article134231.htm.

perspective. For International use the USA has also adopted the OECD Model[505] as the basis of its international tax treaties, rather than the United Nations model. In the USA, on a national level, it highlights the need for regulations as to what the structure for Internet taxes if any should be and how this should be regulated and implemented.

Wireless Issues

Another problem that is creeping up and for which regulations may be required soon is the that which involves wireless phone blocking and jamming devices. [506] Four Catholic Churches in Monterey California have installed these devices to block out bothersome rings during services. [507] They have varying cost with the expensive models costing about $2000.00. These devices use radio waves that can operate within 50 - 100 feet radius and can block out cellular phones in the range of 825Mhz-1990Mhz[508]. Those opposing the use of this technology include the Cellular Telecommunications and Internet Association (CTIA), which contend that not allowing calls to go through may pose an emergency risk hazard as well as the fact that they are illegal.[509] Although these are illegal in the USA, other countries have allowed their use. This includes

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505 Sandra P. McGill, Lowell D. Yoder, From Storefronts to Servers to service Providers: Stretching the Permanent Establishment Definition to Accommodate New Business Models, VI Adapting the PE concept to E-commerce, A, PE definition Difficult to Apply to E-Commerce Business Model, Page 156, http://www.mwe.com/info/pubs/mcgill-yoder.pdf.

506 Olga Rodriguez ,Churches Installing Cell Phones Jammers, Yahoo News, Sat Oct 16, http://wwww.yahoo.com/news?tmpl=story&u=/ap/20041016/ap_on_hi_te/cell_phone_jammers_4.

507 Olga Rodriguez Churches Installing Cell Phones Jammers, Yahoo News, Sat Oct 16, http://wwww.yahoo.com/news?tmpl=story&u=/ap/20041016/ap_on_hi_te/cell_phone_jammers_4.

508 Global Gadget, Cell Phone Jammers, http://www.globalgadgetuk.com/mgb5.htm.

509 Peter Suciu , Techworthy, The Jammers Debate, May 2004, http://www.techworthy.com/Laptop?May2004/Jammers-Debate.htm.

France where survey shows that 85% of the French favored this process.[510] In fact, in 2003, the French developed standards for their use.[511] Although phone call prevention is not currently a problem in the USA, it may be that this is an issue that may require regulation of some sort soon.

Another problem with wireless phone use is that which involves the packaging of .22 caliber handguns that can fire up to four shots in cell phones. This was discovered by Dutch police in 2000.[512] The right to bear arms is a one of the constitutional rights that citizens of the USA has. The addition of firearms in telephony devices can be argued by some as an extension of the uses of this gadget. However, in a time of increased security needs such as that which exists now, this is an issue that may require regulation as it asks the questions of what should be included in certain portable gadgets such as telephones?

Closely associated with this question is the medical aspect of the issue. Various reports have circulated about cell phones causing cancer of the brains. Although The Food and Drug Administration in the USA had originally stated that the emissions from wireless phones are miniscule, a study done by the Swedish Group, the Institute for Environmental Medicine at Karolinska Institute Stockholm linked wireless handset to cancer tumor.[513] In South Africa, in 2001, the South Africa's Bureau of Standards started monitoring radiation levels from wireless telephones and noted that the possibility

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[510] Daithi O hAnluain , They be Jammin' in France, Wired News, ,grro://www.wired.com/news/culture/0,1284,5123,00.html.
[511] Daithi O hAnluain They be Jammin' in France, Wired News, Mar. 23, 2002, http://www.wired.com/news/culture/0,1284,5123,00.html.
[512] Elisa Batista , Ring, Ring, You're Dead, Wired News, , Sep. 28, 2001,http://www.wired.com/news/wireless/0,13824697,00.html.
[513] News.com, Study Links Cell Phone, Tumors, CNet News, Matt Hines, http://news.com.com/Study+links+cell+phones+tumors/2100_1039_3-5409531.html.

existed of instituting a national radiation standard. [514] Also, a Dutch woman's face was burnt after her wireless phone ignited while she was using it.[515]

Cognizant of these problems, some of the large wireless mobile phone manufacturers, decided to develop Specific Absorption Rates (SAR) standards by which all telephones would be labeled for consumer uses.[516] In the USA, the FCC in association with the Food and Drug Administration has adopted a rate of 1.6watts per kilogram(1.6W/kg) as a safety standard for the USA.[517] Parents in the USA and in Britain have been advised not to give their children cell phones s the long term health risks are still uncertain. [518] This is also another problem that would have to be looked at so that as more and more high frequency bands of the electromagnetic spectrum are used. The harmful effects of these bands will have to be researched so that rules can be made that will protect not only the environment but also the health of individuals.

Cost Issues Pertaining to VoIP

International countries on the issue of traditional telephone calls impose a higher tariff rate so that they can receive a high revenue when payments are split between countries.[519] In the case of ISP, and connections to other countries, there is no policy

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[514] Mseek.us, SA's SABS to Monitor Effect of Phone Radiation, mseek.us, http://mseek.us/html/page_3059_sa__39_s_sabs_to_monitor_effects_of_phon.html.
[515] Mseek.us, Woman Suffers Facial Burns from Cell Phone, http://www.cellular.co.za/news_2003/082203-woman_suffers_facial_burns_from.html.
[516] Mseek.us, SA's SABS to Monitor Effect of Phone Radiation, mseek.us, http://mseek.us/html/page_3059_sa__39_s_sabs_to_monitor_effects_of_phon.html
[517] Cellular Telephone Specific Absorption Rate(SAR) , 01, Oct 04, http://www.fcc.gov/cgb/sar.
[518] MSNBC.com, The Associated Press, Cell Phones may present health risks for kids, Scientist say parents should think twice before buying them. March 20 2005, http://www.msnbc.com/id/7251038.
[519] George Sadowsky, Raul Zambrano, Pierre Dandjinou, Internet Governance: A Discussion Document, Pepared for the United Nations ICT Task Force, Para 78, P 18, New York, May 2004, http://pws.prserv.net/sadowsky/papers/unintgov.pdf.

similar to that among telephone companies. As a result of this, they bear the full costs of connections made. According to Sadowsky et al;

> ".. The critical question here is both a lack of adequate empirical analysis to determine whether the current system is "fair", and a lack of "governance" space to deal with the issues on a more systematic and complete fashion. As it stands today, the issues is not likely to be resolved in the short or medium run".

This has special implications for VoIP. With VoIP, the phone calls are moved over the internet and all the consumer had to do was pay for the local call. [520] The thing is that there a lot of different costs involved – Toll cost, International long distance calling cost, infrastructure costs of lines they use and the question is who get to pays for this? What format must the cost structure for billing take not only from a national level but when it becomes an international one?

No discussion on Telecommunications can be complete without discussion of the Electromagnetic Spectrum. So as to give a rounded view of the discussion that this paper has studied and analyzed, the issues of the electromagnetic spectrum will be looked at in this last section of the paper. This is because at it most basic unit, telecommunications is all about dealing with these waves of ions.

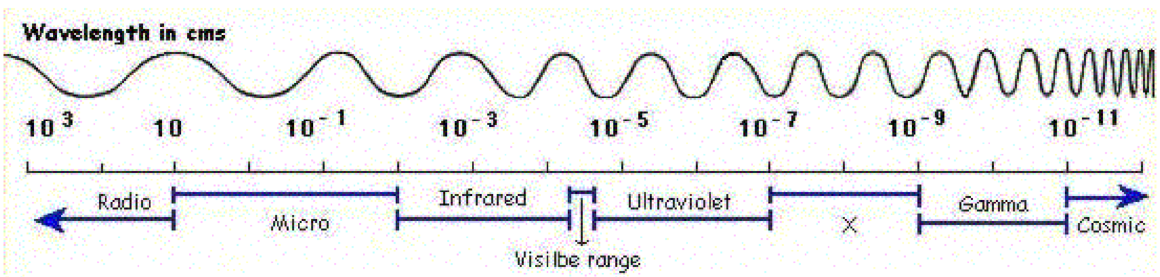
Electro-Magnetic Spectrum Issues

The Telecommunications Industry faced a lot of problems in the early part of the C21st which caused the collapse of companies such as Winstar, WorldCom and KPN QWest(xv), these problems could be looked on as a temporary setback for the industry as there will always be a need for the services that are offered[521]. A discussion of the Telecommunications Industry cannot be considered complete without a discussion of the

[520]BBC Talk is cheap(over the net), BBC News, Mondany 8 April, 2002, http://new.bbc.co.uk/1/hi/in_depth/sci_tech/2000/dot_life/1916734.stm.
[521]

Electro-magnetic spectrum. The basis of all telecommunications is the electromagnetic waves that are converted into electrical energy. Currently, this is an area where both on a national as well as on an international level the detailed consideration and regulatory concern that should be provided still has more to do. This section will isolate some of the more pressing needs which need to be highlighted so that more discussions on them will ensue. This paper though presenting the issues will not be involved in the analysis of these. Figure 35 shows the electromagnetic spectrum

Figure 35 The Electromagnetic Spectrum



The Electromagnetic Spectrum is the communication channel which allows information to travel from a source to a destination. It is a photon stream that that has different energy levels with radio waves having the lowest energy levels and increasing to the highest levels of cosmic particles.[522] The issues relating to the electromagnetic spectrum includes that of access to frequencies that are currently not being used so that new

[522] The Electromagnetic Spectrum, http://imagine.gsfc.nasa.gov/docs/science/know_12/emspectrum.html.

technologies could be developed for them. Other issues pertain to overuse and congestion or under use and inefficiency, if it is not regulated. [523]

With the creation of satellite technology this has also added another issue to the Electromagnetic Spectrum debate as it concerns satellite locations. Since investments in satellites deployments are very expensive, the Electromagnetic spectrum has also been the cause of international disputes such as the one involving the location of geostationary orbit fixed satellites. Satellites like second moon in space are usually at height of 22,300 miles up and they move at the same rotational speed of the earth. [524] The first satellite Sputnik was deployed by the Russians in 1957 and the USA followed with the deployment of Telstar1 in 1962. [525] By 1990, there were over 31 satellites in space

In the allocation of satellites, discrete portions of the available spectrum are given for specific uses in a primary or secondary basis. Primary allocations are free of interference while secondary allocations are not. Once an allotment of specific bands has been given to countries, individual nations determine how the different bands will be used nationally by giving licenses to assigned users. In the USA, to allow access to different spectrum bands, auctions have been conducted since 1994.[526] These auctions are the result of the 1993 Omnibus Budget Reconciliation Act which allowed for auctions

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[523] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p2, Artech House.
[524] Joseph Dominick, Barry L. Sherman, Gary Copeland, Broadcasting/Cable and Beyond, An introduction to Modern Electronic Media, p306, McGraw-Hill Publishing Company, 1990.
[525] Joseph Dominick, Barry L. Sherman, Gary Copeland, Broadcasting/Cable and Beyond, An introduction to Modern Electronic Media,p306, McGraw-Hill Publishing Company, 1990.
[526] FCC, Federal Communications Commission, Autions, About Auctions, http://wireless.fcc.gov/auctions/default.htm?job=about_auctions.

over lotteries for the disbursement of bands of the electromagnetic spectrum and they are open to individuals or companies that are qualified bidders. Upon applying for a bid, an upfront payment is expected of bidders.[527] Although actions are allowed for domestic satellite services, in the USA, they are not allowed for international satellite services due to fact that the satellite industry had concerns about repeating the process in many international country should the USA as a leader start this trend.

Internationally, countries have an identification that the International Telecommunications Union (ITU) has given as a guide as to what spectrum countries can jointly use for specific as well as a designation as to what technology can be used in a particular band. Currently, the ITU is working on a gray spectrum concept that will allow authorize flexible use of a band based on the amount of money it can generate.[528] With regards to joint spectrum use, satellite service providers and equipment manufacturers, face the problem of coordinating the band that they have been allocated within one country to the band that is been used in another country so that the technology they wish to deploy will be able to work in different countries.[529]

Many special interest groups of users which include governments, businesses, academic research as well as other special interest groups all vie for some part of the spectrum. In the case of the businesses, interested parties buy bands in the hope of deploying new services or making additions to current deployment of wireless cable services, 3G mobile service, mobile satellite services and paging services. This has

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[527] FCC, Federal Communications Commission, Autions, About Auctions, http://wireless.fcc.gov/auctions/default.htm?job=about_auctions

[528] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p11, Artech House, 2003.

[529] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p16,Artech House, 2003.

spun off a secondary market where those with valid rights resell what they had been authorized to use. One of the outcomes of this resale is that it creates the issue the new licensee may want to use the band for a purpose different than what it was originally licensed for.

A big part of the government as a stakeholder in the spectrum issue is the military of each nation which in the past had no competition to their pick of the spectrum band and which they would hold and often times inefficiently use.[530] The security concerns usually associated with military activities, make it difficult to know which spectrum that had been assigned for their uses are not efficiently utilized and which could be leased off as secondary allocations.[531] Also, it is usually a very political and expensive issue to try to get bands away from the military that most companies will not bother with it, and in most cases those needing the spectrum are usually vendors of the military.[532]As a result of this, a particular band that could be best suited for a wider commercial application may not be available. [533]

Also, in most countries the bands that the government uses is not regulated. Although some countries such as the United Kingdom have tried to encourage governments units to trade underutilized spectrum for profit, some argue that this may be an encouragement for government to horde bands in the hopes of getting even higher

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[530] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p19, Artech House, 2003
[531] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p19, Artech House, 2003
[532] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p57, Artech House, 2003
[533] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p55, Artech House, 2003

profits later, thereby harming the private sector.[534] Other countries like Nigeria, have utilized a model in which three different management groups regulate the use of the different types of spectrum use – government, non-broadcasting and broadcasting.[535] This is a similar model that exists In this USA, where the Federal Communications Commission (FCC) and the NTIA shares the regulatory duties for the USA's Electromagnetic Spectrum allocation with the FCC regulating the spectrum for commercial uses while the NTIA regulates it for governmental uses.

With the division of the spectrum management duties in several units, although currently this is a feasible implementation, in the long run, this is a structure that will have to be changed. This is because, as more intensive uses are made of the spectrum, for the efforts to be cohesive and efficient, there will have to be a single unit that can have enforceable rules that will not only regulate with regards to extending market expansion but will also protect the citizens of the countries.

As more and more harmful radio waves past the 3GHz limits are getting utilized for services, there will have to be method of not only licensing for profit but also certifying that the welfare of the citizens are taken into consideration. Currently spectrum efforts are getting centered around disbursing the spectrum and not so much at health related issues. Furthermore, with the current innovations that are being made in the internet and in other telecommunications area, the term 'broadcast' is moving away from its traditional connotation and as such a newer way of looking at the broadcasting industry

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[534] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p55, Artech House, 2003.
Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p57, Artech House, 2003.
[535] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p61,Artech House, 2003.

may have to be explored. This will have tremendous impact on the broadcasting stakeholders who have traditionally operated between the 30-3000MHz bands.

Another group of business stakeholders in the spectrum resources are the largest business stakeholders which are the Wireless service providers such as Cingular Wireless which recently acquired AT& T to make it the largest service provider, and manufacturers of wireless products.[536] Spectrum Service Providers often find themselves embroiled in matters pertaining to them keeping spectrum they already had or getting involved in debates over acquiring newer one with many factors contributing to their success among which are, political clout, budgets that could be expended, perceived benefits of the spectrum as well as ability to endure the rigorous process of getting a license.[537] Manufacturers have an interest in getting internationally recognized bands for their products and have such advocated single band for single service internationally. This has met with opposition from the USA but it may be that as the industry progresses, this may become an eventuality. [538]

The issues researchers in the USA have to deal with is that of sharing a band which has in the past proven not to be very attractive for commercial use. However as more technological advances are made that allow these UHF and SHF bands that educational and research community has had free access to in the past, to become more commercially attractive, it is possible that there will be greater issues over it licensing and access in the future that will have to be dealt with.

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[536] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p63, Artech House, 2003.
[537] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p60, Artech House, 2003.
[538] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p61-62, Artech House, 2003.

One of the main issue affecting stakeholders of the Electromagnetic spectrum centers around the issue of interference. Interference affects are seen in a variety of way. One such is how atmospheric or physical factors such as rain may affect the propagation of waves. Rain or vegetation or buildings may be cited as reasons why a particular band may not be suitable for a particular service and may affect the performance of the service if a particular band is used over another. Closely associated with this is a technical issue in that the signal strength of one service may merge with and cause problems with the signals from another service already using a particular band.[539] These issues affect specifically wireless services. As a result of this, there is the concern that the price of these services will become increasingly higher as regulatory fees are imposed on the use of the spectrum bands these services utilize which will cause these services to be more expensive than that of wired networks which do not rely on wireless transmissions.

Spectrum Location

Another issue involving the Electromagnetic Spectrum has to do with the location of non geostationary orbits (NGSO) satellites which operate at ranges of about 412 miles (780 km) above the earth. These satellites, provide broadband data and voice service and have an advantage over Geo stationary orbit (GSO) satellite transmissions because they have a shorter transmission delays. [540] In the 1994, there was interest among competing companies in securing the KA band that generated controversy both internationally and nationally. One such competitor was Teledesic who initially wanted

[539] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p44, Artech House, 2003.

[540] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p22, Artech House, 2003.

this spectrum for broadband service provision that would have installed over 800 orbiting satellites in Space.[541] The Teledesic created a controversy both from current operators who feared displacement by such a deployment as well as from governments who were apprehensive of interference and as such the project did not go through.[542]

Though this plan did not go through, it highlights some issues that have to be addressed at this relatively early stage of satellite development and telecommunications expansion, some of these factors that are not being considered are

- Is there a point in which there will be too many satellites deployed over the earth? Is so what is that point?
- How will these satellites be disposed off once newer and improved models are developed?
- What are the effects of the satellite deployments on the earth's atmosphere in light of problems such as global warming?
- What regulations if any are necessary to balance the needs for 'cleaner' earth with the need for faster and improved communications systems? How should these be implemented in the USA so that the FCC's goal of fairness versus profitability will be carried out? How should this be handled Internationally?
- What incentives if any are governments or specifically the USA government giving to developers and manufacturers for communications systems that will be biodegradable? – is this possible?

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[541] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p23, Artech House, 2003.
[542] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p23-25, Artech House, 2003.

Admittedly, it is easier to ask questions than it is to provide solutions for them. However, as a starting step, this should be one of the first places from which the foundations for the telecommunications policies that will drive a profitable, healthy and productive earthly future should be built. These questions are pertinent because it will allow the development and implementation of newer models of communications systems while allowing older models to be retired. It is also pertinent in light of the filling up of disposable sites in landfills and the earth's global warming problems. Treating the problem as a whole rather than a piece meal attempt will in the long run be beneficial to all stake holders and earth citizens. At this early in the process of developing orbital as well as ground satellite systems, these are issues that the ITU should be considering internationally and nationally that the FCC and the NTIA should be tackling as well, even as they tackle the issue of regulating and licensing the spectrum itself.

Spectrum Standards

Another issue that has to do with spectrum allocation has to do with standards that are used in each spectrum. This controversy that accompanies this issue, is seen in the disagreement that ensued over which spectrum should be used for 3G wireless services.[543] Although the World Administrative Conference (WAC) of 1992 had allocated the 230MHz for 3G services the USA and some other countries did not use it for this purpose and as a result in the WAC of 2000, the ITU determined the 1,710 to 1,855 MHz (1.7GHz) band or the 2,500 to 2,690 MHz (2.5GHz) or the 2,700 to 2,900MHz (2.8GHz) were most suitable for this use. However, since the 2.8GHz was already being used by

[543]Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p26, Artech House, P26, 2003.

the USA Federal Aviation Administration (FAA) and the weather service this band could not be used. The vote was then between the 1.7 and the 2.5 GHZ bands with the European Union and the USA advocating against the use of the former as it was already in use by Fixed Service (FS) and Mobile Service (MS) systems on a co-primary basis. Similarly, the 2.5GHz was already in use by broadcasting services, FS as well as Mobile Satellite Services (MSS) A compromise was reached that allowed either bands to be deployed by member countries. That there are great expected future returns in 3 G services is shown by the recent prices paid at actions for these spectrums. In England, there was a $6 billion bid for a Universal Mobile Telecommunications System (UMTS). A corresponding issue to this is what standard will become the global standard. Although there is the 3G standard, the Japanese came out with the WCDMA and the USA with the cdma standard. Again this is another area in which there has to be some consensus as to what standards will be used to simply manufacturing and user issues. The regulating bodies in the USA will have to work at developing standards that will ensure the viability and competitiveness of its standards internationally.

Spectrum Users

Another group of stakeholders in the spectrum issue are the consumers who depending on their needs may accept services with little or no interference from their service providers. High end consumers such as large organizations like banks usually require little interference because of the security needs that are inherent in their business and low end consumers such as general business consumers are more likely to accept the some interference. These requirements therefore affect not only the spectrum band that is used but also affects the costs that are involved with the service use. There is also the added need in the case of high end consumers to have standardization of equipment for international use. The costs for these different services depending on the spectrum used are then affected by the costs of other factors such as regulatory charges, market demand, availability of other alternative networks including landlines.[544] Other costs include research and development costs as well as vendor and consumer equipment costs, and other infrastructure costs.[545] In a similar manner regulations that pertain to the use of these layers would have to be done in such a way that it continues to remain competitive.

Multi-purpose use of Spectrum

Another issue that concerns spectrum governance is that of allowing flexibility at the national level so that competing services can use a specified band that has a particular technical designation for more than on service type. Proponents see this as allowing the market to determine the best use for a band rather than the government so that a faster technological turnaround can be achieved in the deployment of new services. In this respect in the USA, the FCC is moving towards allowing service providers to use suitable and available technology to serve their customers. It is too soon, in the 'advanced' use of technologies that pertain to the electromagnetic spectrum for the FCC to allow this policy move. Even as more is technologies are developed and implemented by the market, there is a still a primary responsibility on the FCC to regulate these which should not be based only the fact that that interference is avoided but also on the fact that it is safe. In this regard therefore expediency alone cannot be the baseline on which these decisions should be made. Increasingly, there is going to be a demand for more accountability for the health of citizens especially as more and more environmentally harmful areas of the spectrum are tapped into. In this regard then, matters that pertain

544 Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p64,Artech House, 2003.
545 Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p68,Artech House, 2003.

to the electromagnetic spectrum use should be studied and tested rather than expedited. The ramifications of the effects that these waves can have on individuals not only nationally but internationally cannot be under or overstated.

Spectrum License

In the area of licensing, issues arise when more than one competing service shows interest in a particular spectrum band. Traditionally, a way to avoid having a bias decision in the USA for example was to hold a lottery. This resulted however in spectrum trafficking in which secondary markets for spectrum sale arose with the secondary buyers having to pay exorbitant sums for third party service use. To circumvent this process, the FCC now uses a bid auction for the sale of its spectrum bands. This also has given rise to other issues. In using the auction format, the interest of the public is not taken into consideration and usually the spectrum goes to the highest bidder with the most money. [546] Auctions are also illegal under the Outer Space Treaty of 1964. [547] It has been argued by Manners that although auctions are illegal under the this act, that the Outer Space Treaty only covers "outer space" whereas the radio spectrum that are currently utilized may not qualify for outer space.

About half of the earth's atmosphere is located less than three miles above sea level, [548] and about fifteen miles up, there is a lot of heat and poisonous ozone is present. [549]

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[546] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p124, Artech House, 2003.

[547] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p125, Artech House, 2003.

[548] Ndu.edu, Military Geography for Professionals and the Public, 7 Inner and Outer Space, www.ndu.edu/inss/books/Books%20-%201998/Military%20Geography%20March%2098/milegeoch7.html.

[549] Ndu.eduMilitary Geography for Professionals and the Public, 7 Inner and Outer Space, www.ndu.edu/inss/books/Books%20-%201998/Military%20Geography%20March%2098/milegeoch7.html.

Furthermore, starting at about 250 miles from sea level, there are harmful x-rays, ultraviolet rays and infrared rays.[550] These are essentially very harmful to man. Yet satellites are beamed up to 22,000 miles up in space and these transmit back to earth radio waves which are essentially ions. Given that this is the case, waves or particles from this height do indeed qualify as outer space. If this is the case then, arguing that radio magnetic waves do not qualify as being from outer space is not valid. Therefore this is really an issue that has to be addressed internationally by the ITU and other such regional bodies that deal with the regulation of space as well as by the FCC and NTIA, nationally in the USA.

Furthermore, the use of auctions does not really take away the secondary spectrum market created when original licensees do not use the band allocated to them but sell it to others. In the USA, non profit ITFS licensees are using this method to lease spectrum that has been allocated to them to MMDS operators.[551] This market in turn comes with several issues among which are the fact that fallow of spectrum may result from band holders who want to restrict competition or monopolies may end up controlling large portions of the available spectrum. Although Manners has suggested some method in which this secondary market may be regulated, the solutions of lease or resale that she advocates are really short term stop gap recommendations.[552] Rather than having policies that allow for spectrum to be held before the technology is available to use it, at this relatively early starting period in spectrum regulation, a policy may be to allow

[550] Ndu.edu, Military Geography for Professionals and the Public, 7 Inner and Outer Space, www.ndu.edu/inss/books/Books%20-%201998/Military%20Geography%20March%2098/milegeoch7.html.
[551] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p129, Artech House, 2003.
[552] Jennifer A. Manner, Spectrum Wars, The Policy and Technology Debate, p156, Artech House, 2003.

research bands to be available at different levels so that research may make available competing safe technologies to use a particular band before it is ready and available to be distributed.

This will eliminate the fallow practice or the secondary market phenomenon. There is really no need to rush off and auction the spectrum without really very insightful and long range considerations given to this action. The government must give incentives that will allow for efficient and safe technology that will make use of the different levels of the spectrum and may also encourage business and other research institutions to participate in this. Even more so than clean water and air, the electromagnetic spectrum management and regulation is an urgent priority that must not and should not be left to market forces alone.

In the spectrum discussion, another aspect that is not usually discussed is the band that is used by household appliances and toys. Attention will have to be paid to this area as more and more electronic appliances and toys are developed to see how they are affecting the environment as well as how they are affecting the lives people who depend on them for day to day living.

CHAPTER 17

CONCLUSION

The study set out to find out three basic research questions in light of the new and rapid rate of technological innovations. The first was whether the Silo Model Method was the same as that of the horizontal Layers Model in telecommunications policy formulations. To answer this question the organizational structure of the FCC was looked at as a proxy to see the shape of its regulating architecture. The architecture or function that it performed was then equated to ability. The FCC was found to be made of five internal offices that regulated different sectors of the industry. Furthermore, it was noted that Title 47 of the USA Codes which is listed as Telegraphs, Telephones and Radiographs also had a similar arrangement of vertical laws as the departments of the FCC. In this instance, given that architecture was found to be similar to the manner in which the governing laws of telecommunications are seen in the Title codes, the argument was made that from an organizational perspective, the arrangement of the departments were in line with regulating and carrying out the implementations mandates of the different laws in the Codes.

Further observation of the structure of the laws found that the laws were not only isolated entities but that they were also related to each other by horizontal connections such as the indecency requirement of the law. Other horizontal connection or layering are seen in the wording of the rules which state that all rules are subject to the rules of Title II while all rules in the Laws of the Nation are protected by the First Amendment which guaranties total freedom. Using this extrapolation a conclusion was made that the structure of the law itself was both vertical and horizontally structured. Furthermore the argument continued that the Internet was such that it relied on standards such as the OSI and the TCP/IP models for how routines and process should be carried out on the Internet. A supposition was also made that these standard or laws were based on the format of western laws in that they had both a horizontal components in which devices communicated across the network by allowing information flow across similar layers as well a vertical component in which communications occur between adjacent and dissimilar layers of the network in a vertical manner. The extrapolation was then made that this vertical and horizontal communication pattern that the protocol standards of the Internet made possible was in fact similar to the vertical and horizontal arrangement of the law. Furthermore, I argued that the reason why this structure was not so apparent in the laws was that the FCC's format obscures or does not emphasize its horizontal connection or linkages while the horizontal protocol arrangement of the Internet standards highlights this. Following this line of reasoning, conclusion was made that the Silo and the Layers method of regulating were the same. The conclusion from this was that the current structure of the regulatory policy as used by the FCC to regulate telecommunications issues in the USA was adequate. In this instance then it could be profitably used to regulate structures of the Internet such as VoIP.

To answer the second question of whether Basic and Enhanced services were similar and whether Telecommunications and Information services were similar, first of all, the study looked at the similarity that all these services had. It was found that their providers were all common carriers. Furthermore, from a technical perspective I showed the relationship of the different elements that make up a network. Then I argued that contrary to scholars such as Whitt (2004) who were arguing that regulations should take on a new pattern in which only the medium and lower physical layers were regulated while the upper application layers were not , I argued that based on the structure of protocols alone, that Basic and Enhanced services were all essentially the same program codes that had been given different functions and that these codes as middleware and Application Program codes gave intelligence to devices which in turn formed the basis of applications or services. From this, the argument was then made that as a result of this similarity in function to isolate arbitrarily the upper layers of a service as being that which contained intelligence and therefore not meriting regulation would not be giving a true picture of the way the technology operated because intelligence in a network was a total and whole package that involved both the media and the other network devices such as the routers, gateways and gatekeeper and programs. Furthermore, I then showed that in fact, the devices that large Central Office switches used were now duplicated in these gateways and gatekeeper devices and that as a result of this, they facilitated the production of such services as VoIP. To this end I illustrated the manner in which a PSTN carries out it provision of a telephony service as similar to that in which VoIP protocols such as SIP and H.323 do the same thing. I used this to show that the distinctions of Basic and opposed to Enhanced were from a protocol perspective non existent since all protocols could primarily be considered to be neutral. My rationale for this was that program calls and routines which are the basis of protocols and [in reality what the protocols actually are,] are only differentiated by the 'functional' processes that they perform but that basically they were the same. Given that it is this stacking of program function that made up protocol stacks in reality, protocols can therefore be perceived as being neutral. This is because for example two applications or services can be stacked or built with the same sets of routines and the only difference between the two would be how the different calls are made at different times.

In making the Telecommunication Act of 1996, the 104 Congress took away the onus from looking at the regulations from a protocol perspective to that of a looking at it from a network perspective. With this new way of looking at services, there were problems with how the law should be implemented. In a challenged case the Supreme Court ruled that the laws did not allow open access to the networks of incumbents in the case of AT&T v Iowa utilities board. However the study showed that this was what the Congress had in fact done by making it a 'duty' for incumbents to provide network elements for CLECs and 'were so ordered' by the Law. Furthermore, the law had explicitly stated that the access should be in an unbundled manner. What this in actuality did, was make the CLEC the ones who could determine when they had been prevented access or not. Given that these and the ILECs were in competition it would always be to their best interest to ask for more. As a result of this, the argument was made that in actuality the 104th Congress had granted the CLEC open access to the networks of the ILECs.

In arguing that Telecommunications Services were the same as Information Services, I relied again on the sameness of code and basic structure argument that at the smallest and lowest levels of the either services the codes that facilitated their intelligence were both the same and that embedded in the intelligence of the gatekeeper and gateway devices which made up the unbundled network elements were the tools that allowed the signaling, multiplexing and other maintenance features that the CO used to provide similar service. This argument essentially relied on the protocol neutrality argument. Furthermore, I proved that Telecommunications Services were the same as Basic services as the laws had defined them. Then I showed that Enhanced Services were the same as Information Services from this I went on to logically argue that Telecommunications services were therefore the same as Information services. From this I concluded that if access was not exclusively for telecommunications services as the wording of the law had specified and if both were the same, then there was really no need for a distinction between Telecommunications Services and Information Services.

Following these arguments I looked briefly at several inconsistencies in the law that these distinction of services made apparent. Among one such was that which related to the regulation of loops and switches. Although the FCC had allowed access to the routing tables of incumbents noting that they were essential for the service provisions, the 104th Congress had considered these to be part of the management feature of the switches and these were not unbundled. These are tools that those providing information services must have access to. I recommended in this case that it was not in the best interest of the incumbents to give open access to their routing tables for security reason but that the technology had evolved to such a point that portions of the table that each CLEC used could be made available to them without compromising the confidentiality of other clients that the Incumbents had.

Many have advocated that the new set of laws should be regulated based on the Internet and its horizontal format, this study has shown however, that although there are inconsistencies in laws it is not due to an inherent mismatch between the laws and the new technologies but rather it is due to the fact that innovations in technologies occur at such a fast rate that there is always a period when the laws and the technologies they are supposed to regulate are not in sync. Never the less, having said all this, the fact still remains that although the situation as it is right now is adequate, thought has to be given based on not only the technologies but also the welfare of the citizen by way of consideration of their health and other social factors that may get violated as to how it is that these law have to be structured in the future. A whole lot of questions were asked in the paper for which currently there are simply no answers that fully satisfy as the issues as a whole. This wholeness aspect of regulations will have to take into account the fact that in the area of the Internet, several new issues are developing which have not been addressed as of yet because they are new and as such have not been encountered before and that as a result of this, the structures of the FCC may not be quite adequate in handling the newer responsibilities without added authority.

In the area of VoIP in particular, the telephony industry faces many challenges that the FCC has to address. In this paper, I showed that indeed VoIP is in reality an Telecommunications service though in actuality it is listed as an Information Service. What this finding does is that it shows that regulations such as those that pertain to information services, telecommunications services as well as cable services and other providers that all use the common carrier classifications have to be reviewed. This is because the study showed that the network elements as tools that are used by both telecommunications service providers are the same as those that are used by competitive information services providers and is in actuality the same as those that are used by cable service providers for the provision of voice and other Internet Services. This therefore highlights the fact that a more comprehensive look at the technologies of Telecommunications Industry as a complete whole are needed to ensure the efficiency of this industry and its related markets with regards to regulations. This will avoid the perception of having inconsistent regulatory standards.

As a result of this, the answer to my research question 3 as to whether generalization can be made from the VoIP study to the Telecommunications Industry in general, the answer is yes for now. Yes, the structures in place right now can provide the type of regulations that the industry needs. However, the matters of inconsistencies have to be looked at handled in a rather fast manner so that innovations are not put on hold while companies try to win legal cases. The state of the industry now globally is that to maintain the competitive edges they have, companies cannot afford to either have huge funds tied up in legal actions or to have to wait to implement new features. This is because it they cannot offer such services, competitors from other nations will find ways of doing it from a remote manner. The new issues without doubt have to discussed and addressed because the continuation of the smooth functioning of the Internet and hence the Telecommunications Industry depends on this.

The paper also looked briefly at some of the newer Internet related issues that by association now also affect the Telecommunications Industry and the recommendations was made that the current structures of the FCC was not quite equipped to handle these with regards to laws or policy structures and recommended that these be addressed.

Finally, the paper also looked at the Electro magnetic spectrum from to provide a rounded view of all the issues and concerns that the current Telecommunications Industry faces. Here again a caution was made that important as they are to the smooth functioning of the industry, the health risks that these waves may have, will require some research to ensure that they are safe for human use.

A lot of questions were posed for which answers could not now be provided. These are all areas in which further research can be carried out.

APPENDIX 1

INTERNET ADMINISTRATION

I. The Address Supporting Organization (ASO).

ASOs are charged with managing the IP address space. Currently, there are 4 Regional Internet Registries (RIR) that are regionally located. These are:

1. The American Registry for Internet Numbers (ARIN).

This non-profit organization provides mainly IP addresses for the USA, Canada and Sub Saharan Africa.[553]

2. Latin American and Caribbean Internet Addresses Registry (LACNICVII) which provides addresses for the Caribbean, Mexico, and for Central and South America.[554]

3. Re΄seux IP Europe΄ens Network Coordination Centre (RIPE NCC) provides IP numbers to Europe, the Middle East and parts of Asia.[555]

4. The Asia-Pacific Network Information Centre (APNIC) provides registry services for Asia and the Pacific Region.[556]

In October of 2004, ICANN announced provisional recognition of The African Network Information Center (AfriNIC) which will serve as a regional registry for Africa.[557]

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553 Wordiq, Definition of American Registry for Internet Numbers, http://www.wordiq.com/definition/American_Registry_for_Internet_Numbers.
554 LACNIC, http://www.lacnic.net/en.
555 RIPE NCC, http://www.webopedia.com/TERM/RIPE_NCC.html
556 Wordiq, Definition of American Registry for Internet Numbers, http://www.wordiq.com/search/APNIC.
557 ICANN, Announcements, AfriNIC Moves Forward and Promotes Regional Integration, 14 October 2004, http://www.icann.org/announcements/announcements-14oct04.htm.

II Generic Name Supporting Organization (GNSO)

The SO that ICANN has delegated responsibility to for handing matters relating to the Domain name system is the Domain Name Supporting Organization (DNSO).[558] This organization now renamed the GNSO is responsible for the management of the following[559]:

- generic Top Level Domains (gTLDs)
- country code Top Level Domain ccTLD
- Restricted generic Top Level Domain (Restricted gTLDs).

Since taking over as administrator, ICANN through the GNSO has increased the number of gTLDs by adding new domains such as ".aero", ".biz", ".coop", ".info", ".museum", ".name", ".pro" domains, [560] as well as the ".post" and the ".travel" domains[561]. The Restricted TLDs managed by this group are the ".gov", ".edu", ".mil", and the ".int" domains.[562] The GNSO manages also through ccTLDs registrars, domain names in country codes such as the ".uk" ".jp", ".sl", ".us", ".au",".iq",".rs"

In addition to managing Domain Name Spaces and IP addresses, ICANN also manages the root servers of the Internet. Currently, there are 13 such root servers with 10 residing in the US and the other 3 in Stockholm, London and Tokyo.[563]

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558 Living Internet, Internet, Management Internet corporation for Assigned Names and Numbers, http://livinginernet.com/i/iw_mgmt_icann.htm.
559 ICANN, GNSO, FAQ, http://gnso.icann.org/faq.shtml.
560 Iana, Internet Assined Numbers Authority, Generic Top-Level Domains, http://www.iana.org/gltd.htm.
561 Anick Jesdanun, New web domain names get preliminary nod, Tech Wire, Thursday, October 28th., 2004, http://wwwseattlepi.nwsource.com/business/aptech_story.asp?category=1700&slug=New%201.
562 Iana, Internet Assined Numbers Authority, Generic Top-Level Domains, http://www.iana.org/gltd.htm
563 ICANN, GNSO, FAQ, http://gnso.icann.org.faq.shml.

III The Protocol Supporting Organization (PSO).

The third Supporting Organizational Group to ICANN is the Protocol Supporting Organization (PSO). This advises ICANN on matters that deal with the protocol parameters of the Internet.[564] It deals primarily with the technical standards that allow computers to communicate. The PSO is supported in dealing with its tasks by the following[565]:

- Internet Engineering Task Force (IETF)
- The World Wide Web Consortium(W3C)
- The International Telecommunications Union(ITU)
- The European Telecommunications Standards Institute(ETSI).

III.1

The ITU is headquartered in Geneva Switzerland is part of the United Nations

It is concerned with the coordination of Telecommunications networks and services between governments and the private sector.[566] It is made of up three divisions.[567] The three divisions are:

- The ITU Radio-communication Sector (ITU-R)
- The Telecommunication Standardization Sector (ITU-T)
- The Telecommunications Development Bureau (ITU-D, BDT).

[564] Protocol Supporting Organization, ICANN, http://www.pso.icann.org.
[565] Living Internet, Internet Management, Internet Corporation for Assigned Names and Numbers, http://livinginternet.com/i/iw_mgmt_icann.htm.
[566] Welcome to the International Telecommunication Union, http://www.itu.int/home.
[567]Welcome to the International Telecommunication Union, http://www.itu.int/home.

III.1.i The ITU- R

The ITU-R, manages the radio frequency spectrum orbiting satellites, and exhaustible finite resources.[568] In this respect, the ITU-R manages communications resources pertaining to broadcasting, space research, meteorology, global positioning environmental monitoring, as well as fixed and mobile communications.[569] Specifically, it allocates and radio frequencies and satellite orbit positions so as to avoid interference between radio stations of different countries.[570]

It is governed by a 12 member board that approves the rules that are used in regulating and registering radio frequencies[571]. The board also settles matters of disputes and acts on appeals to the ITU as well perform advisory functions to Radio communications conferences.

III.1.ii The ITU-T

The ITU-T, is the main international unit that is responsible for maintaining the standards for telecommunications equipment. [572] ITU-T replaced The International Telegraph and Telephone Consultative Committee (CCITT), which was formed in 1865.[573]

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[568] ITU –R, ITU Radiocommunication Sector, http://www.itu.int/ITU-R.
[569] ITU –R, ITU Radiocommunication Sector, http://www.itu.int/ITU-R.
[570]ITU Radiocommunication Sector Mission Statement, htt://www.itu.int/ITU-R/information/mission/index.html.
[571] International Telecommunication Union, Radio Regulations Board (RRB), http://www.itu.int/ITU-R/conferences/rrb/index.asp .
[572] International Telecommunication Union, Welcome to ITU-T, http://www.itu.int/ITU-T/.
[573] International Telecommunication Union, Welcome to ITU-T, http://www.itu.int/ITU-T/.

III.1.iii The ITU _D

The ITU-D is the unit that oversees connectivity, access, regulatory and training issues of developing countries. It works at bridging the Digital Divide as it concerns Developing Countries.[574]

III.2. The Internet Engineering Task Force (IETF)

The Internet Engineering Task Force (IETF) is actually part of The Internet Society (ISOC) which is a professional organization of 150 organizations, 16,000 members from 180 countries.[575]

This organization provides global coordination on matters of the Internet that relate not only to technologies and innovative growth, but also facilitates, education and new initiatives internationally. The Internet Engineering Task Force (IETF) as a PSO unit, works with issues that pertain to the Internet architecture and infrastructure. It is an international open unit and specifically it works with matters that relate to the design, operations, research or selling of Internet related components. [576] Heading the IETF is a General Area Director.

The IEFT works in a layered structure that is comprised of

- The Internet Society (ISOC) - The Organizational home of the IETF.[577]
- The Internet Architecture Board (IAB) - This provides oversight to: Internet [578]Engineering Steering Group(IESG)

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[574] International Telecommunication Union, Welcome to the Telecommunication Development Bureau(BDT), http://www.itu.int/ITU-D/.
[575] Internet Society, All About the Internet Society, http://www.isoc.org/isoc.
[576] Overview of the IETF, http://www.ietf.org/oveview.html.
[577] Internet Society, All About the Internet Society, http://www.isoc.org/isoc.
[578] Overview of the IETF, http://www.ietf.org/oveview.html.

- The IESG is made of Area Directors(ADs) of IETF Working Groups
- IETF Working Groups are Topic organized technical groups - eg VoIP, transport, security, that deal with internet protocols. Each Working Group is headed by an Area Director (AD).

The World Wide Web Consortium (W3C)

This is an organization that was started in 1994 and it is a part of ICANN's PSO. It primary mission is to develop technical protocols and standards for the web that are not only international in perspective, but which are also 'hardware, software, network infrastructure, language, culture, geographic location, physical or mental ability' independent as well as interoperable[579]. It does this by advocating universal access through a medium of trust in which people can be accountable as well as culpable. The W3C also advocates a decentralized web structure that decreases bottle necks in the web architecture and which the web to grow and evolve though the use of hypertext and multimedia techniques.

The European Telecommunications Standard Institute (ETSI)

This is a non- profit organization that is charged with the responsibility of standardizing the Information and Communication Technologies (ICT)of Europe.[580] It is the official representative of the European Commission and the EFTA secretariat. Currently, the ETSI membership is not limited to only Europeans and it has 688 members from 55 countries.[581] As an Institute, it develops standards that are based on market need.

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[579] W3C, World Wide Web Consortium, … in 7 points, http://www.w3.org/Constortium /Points/.
[580]ETSI- European Telecommunications Standards Institute, Who is ETSI, http://www.etsi.org/about_etsi/5_minutes/5min_a.thm.
[581] ETSI- European Telecommunications Standards Institute, Who is ETSI, http://www.etsi.org/about_etsi/5_minutes/5min_a.thm.

One such standard that the ESTI has developed is the Universal Communications Identifier (UCI). This is a standard that will provide a single identification for email addresses, telephone numbers and mobile numbers and all such personal identification numbers. [582] This identifier can be used for a lifetime. The ETSI operates from a market perspective and works at preventing duplication of efforts in the Internet. The ETSI's organization structure consists of a General Assembly of all members GA, an Executive Board, and 3500 technical experts in 200 groups who form the Technical Organization (TA). The TA is the main group that creates and develops standards for the ETSI.[583]

The World Intellectual Property Organization (WIPO)

Although this organization is not part of ICANN, this 181 member state International organization protects Intellectual Property (IP) rights of members.[584] Founded in 1883, this organization became part of the United Nations in 1974 with the mandate of overseeing IP matters. In this regard, it resolves and enforces issues relating to trademark, patent, copyright and works with individuals, governments and businesses on Internet issues relating to licenses and licenses infringement. WIPO is the dispute resolution centre for issues relating to the Internet such as cyber squatting. Cyber squatting is the 'abusive registration and use of Internet domain names. WIPO resolves international disputes online and deals with cases pertaining to generic top level domains as well as country code domains.

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[582] eEurope, News Release, The end of separate numers for email, telephones and terminals, Sophia Antipolis, France .
[583] ETSI- European Telecommunications Standards Institute, Who is ETSI, http://www.etsi.org/about_etsi/5_minutes/orga_a.htm.
[584] WIPO, General Information, An Organization for the Future,

The Organization for Economic Co-operation (OECD)

OECD is international organization made up of 30 member countries as well as 70 affiliated countries, Non Governmental Organizations (NGOs) and Civil Societies. [585] Its primary mission is to deal with economic and social issues. Though it is not part of ICANN, it has contributed a security standard for Information systems and networks.[586] In July 2002, an Implementation Plan for the OECD Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security[587] was adopted. This plan specifies the role of member governments and affiliates in providing for the security of information systems networks in their countries. It also identifies the public policy steps that member nations should adopt in formulating their security plans.

In addition to this standard, OECD has also developed a Model Convention with respect to taxes on Income and on Capital for its members. Article 5 of this Convention has modification to include definitions pertaining to E-commerce that was adopted on December 22nd., 2000.[588]

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585 OECD, Organization for Economic Co-operation and Development, About OECD, http:/www.oecd.org/about/0,2337,en_2649_201185_1_1_1_1_1,00.html.

586 OECD, Unclassified, Implementation Plan for the OECD Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security, Directorate for Science, Technology and Industry Committee for Information, Computer and Communications Policy, Organisation for Economic Co-operation and Development, 02-03-2003, http://www.oecd.org/dataoecd/23/11/31670189.pdf.

587 Unclassified, Implementation Plan for the OECD Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security, Directorate for Science, Technology and Industry Committee for Information, Computer and Communications Policy, Organisation for Economic Co-operation and Development, 02-03-2003, http://www.oecd.org/dataoecd/23/11/31670189.pdf.

588 OECD Committee on Fiscal Affairs, Clarification on the Application of the Permanent Establishment Definition in E-Commerce: Changes to the commentary on the Model Tax Convention on Article 5, December 22 2000, http://www.oecd.org/dataoecd/46/32/1923380.pdf.

Council of Europe(CoE)

The Council of Europe on October 1st., 1985, entered into force its Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data.[589] The council of Europe is made of up 46 countries from which 25 are from the European Union, and 21 are from Central and Eastern Europe. Also, the council has 5 countries which have observer status. These are the Vatican, the USA, Canada, and Japan.[590] The Convention secures the rights of individuals of these nations and guards the privacy and protection of data of individuals. This convention also pertains to processing of files using an automated means. As a result of this, this convention therefore protects the rights of these members countries in cyberspace and on the Internet. Although this Convention pertains to members of the CoE, and is considered part of the Internet protections, such a convention does not exist for members of countries who are not part of this group.

The United Nations Commission on International Trade Law (UNCITRAL)

During its thirty eighth session held between March 12-23, 2001, the working group of this commission considered the problems Electronic commerce and recommended the that the commission research and study further the problems and implications of Electronic Commerce, the findings of which were to be presented at the 44th session of October 11-22 2004. At this meeting it was agreed that the convention to be prepared would be of a general form.[591] Again, although the UNCITRAL is not part of ICANN, it

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589 Council of Europe: Convention For the Protection of Individuals with Regard to Automatic Processing of Personal Data, Council of Europe European Teaty Series No. 108, Article 7, http://www.privacy.org/pi/intl_orgs/coe/dp_ onention_108.txt.

590 About the Council of Europe, origins and membership, http://www.coe.int/T/e/Com/about_coe.

591 United Nations, General Assembly, United Nations Commission on International Trade Law, Annnotated Provisional agenda, para 11, http://ods-dds-ny.un.org/doc/UNDOC/LTD/V04/562/31/PDF/V0456231.pdf?OpenElement.

can be seen here as taking a leadership role in identifying policies that pertain to Internet governance.

The United Nations Conference on Trade and Development (UNCTAD)

This is another such organization that provides help to developing countries on policies and strategy formulation with regards to E-Commerce.[592] This Organization established in 1964, assists developing countries with development issues pertaining to finance development and technology and with the advent of the Internet is now branching out and providing technical assistance in dealing with E-Commerce technical issues.[593]

World Trade Organization

The World Trade Organization is a Trade membership Organization that is concerned with solving trade disputes among member nations through negotiations. Primarily it is concerned with the formulation of rules of trade among its members. [594] These rules are trade negotiations that member countries had agreed upon as contractual and binding in the way that commerce and trade will be performed. Compared to other organizations this was only started in 1995. WTO is part of GATT – The General Agreement on Tariffs and Trade.

Part of it mission is making sure that there are free and open trade among member nations. This is an area that is facing a challenge with the new innovations of the Internet and its effects on trade and commerce matters .

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[592] United Nations Conference on Trade and Development, E-commerce, http://www.unctad.org/Templates/Page.asp?intItemID=1983&lang=1.
[593]UNCTAD, About UNCTAD, http://www.unctad.org/Templates/Page.asp?intItemID=1530&lang=1.
[594] Understanding the WTO Basics, World Trade Organization, http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact1_e.htm.

Although the WTO has not yet come up with a formal set of rules that govern its members with regards to Electronic Tradiing,[595] it ruled in 2004 that the USA's banning state gambling across its borders violated GATT laws.(Get Refr from issues)
In addition to these international organizations in the United States of America, further regulations that pertain to the Telecommunications Industry are the purview of the following offices such as the NTIA, FCC and stat Public Utilities Commission who provide the rules and laws that provide regulation.

National Telecommunications and Information Administration[596]

This organization which was formed in 1978 is the main adviser to and representative of the President of the United States of America on matters pertaining to telecommunications and Information issues on national and international levels. It is part of the Office of Secretary of Commerce. This office is made up of five sections which are the Office of spectrum Management (OSM) which manages spectrum use in the USA., The Office of Policy Analysts and Development (OPAD) which is its main domestic policy formulating body, The Office of International Affiiars(OIA), which is the international and regional policy formulator, the Institute of Telecommunications Sciences (ITS) is the institute for Telecommunications Sciences, which is the research and engineering laboratory of the NTIA, the Office of Telecommunications and Information Applications, which administers the Technology Opportunities Program (TOP) and the Public Telecommunications Facilities Program(PTFP) both TOP and PTFP award grants to government, public and non commercial organizations.

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[595] Electronic Commerce, World Trade Organization, http://www.wto.org/english/thewto_e/tif_e/bey4_e.htm.
[596] About the NTIA, National Telecommunications and Information Administration, http://eee.nyis.fov.hob/nyishomr/snouynyis/snouynyis.htm.

Although this paper did not do any analysis on Internet governance, the statement can be made that some of the structural factors that have been mentioned as possible areas of problems to the Internet are intrinsic to the structure of the Internet and that these allow the network flow that is the beauty of the Internet to occur. Any organization that therefore takes on the management of the Internet will face these problems. In this regards, then, what has to be done is to put in place guidelines that will ensure that this inherent structural flexibility of the Internet is properly handled and that there are mechanisms for a fair review of domains that are denied access for instance or other concerns that the Community may have in reality.

To date, ICANN has been good at working with different organizations and making a cohesive whole of the different units in policy formulations and implementations. However, now may be the time to have input from governments through a defined structure about what they want for their nations and by which other nations (in the manner of the open nature of the Internet) can question and if necessary offer dissenting opinions while respecting the rights of the other nation. In this regards, then, ICANN will have to have authority to make decision as to what will be best for the Internet's growth while taking a particular country's concern into consideration. Also, it will have to have methods of making sure that its decisions are fairly implemented. This is not going to be easy, however given the resourceful nature of the Internet Community I am sure that this is something that is workable.

APPENDIX 2

INTERNATIONAL TELECOMMUNICATIONS POLICIES

The telecommunications policies of areas will be discussed generally to show the movement of telecommunication processes that exists in the international community.

Sub-Saharan Africa

With regards to sub-Saharan Africa, African countries that were ruled by the French and British are still using mostly telecommunications systems that they had from these governments. [597] In addition to this, the structure of PTT (post, telephone and telegraph) that was left over are deficient in terms of hardware, and organizational structures in these nations.[598] An example of this is seen in the fact that African countries in the 1990's were way below other countries in the number of telephone lines that were in use with only 1.5 main lines per 100 inhabitants compared to 65 in the USA.[599]

Furthermore some have suggested that African governments have adversely affected the spread of telecommunications in their nations by either excessively taxing or improperly spending the funds that this industry generated in their countries.[600] Also, the suggestion has been made that Africans should accept 'second hand'

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[597] Graham Mytton, Sub Saharan Surveys, From SaucePan to Dish, Radio & TV in Africa, p23, African Broadcast Cultures, Radio in Transition, Edited by Richard Fardon, & Graham Furniss, Long House Publishing company, Cumbria Uk, 1997.
[598] Eli Noam, Introduction, Telecommunications in Africa, p1, Oxford University Press, 1999.
[599] Eli Noam, Introduction, Telecommunications in Africa, p3, Oxford University Press, 1999.
[600] Eli Noam, Introduction, Telecommunications in Africa, p5, Oxford University Press, 1999.

telecommunications equipment which currently because of pride, they have not done.[601] There is no denying that in general, African countries have lagged behind in implementing telecommunications strategies. There is limited infrastructure, low numbers of indigenous technicians, as well as expertise for dealing with economic and legal issues of international nature.[602]

This coupled with what is seen as an unavailability of a democratic process and the reluctance of African governments to privatize their airwaves is also seen as obstacles to telecommunications growth in African countries. [603] Furthermore, the PTT administrations in Africa have been seen as 'bottlenecks" which prevent their nationals from having access to telecommunications services and as a result in 1998, 95 percent of Africa's population were without access to dependable services.[604]

Despite this however, several foreign investors such as AT&T, Siemens and NTT have plans to lay underwater fiber optics cables and develop networks to help the continent deal with it telecommunications issues. Some of these issues have been stated as problems in deciding how to allocate telecommunications services not only geographically but with regards to what foreign investors should own as well as what

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[601] Eli Noam, Introduction, Telecommunications in Africa, p5, Oxford University Press, 1999.

[602] Eli Noam, Introduction, Telecommunications in Africa, p5, Oxford University Press, 1999.
Eli Noam, Introduction, Telecommunications in Africa, p6, Oxford University Press, 1999

[603] Eli Noam, Introduction, Telecommunications in Africa, p6, Oxford University Press, 1999.

[604] Heather E. Hudson, New Communications Technologies for Development in Africa, p 290, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.

format the competition should take while taking into account the objectives of both the different nations and the investors.[605]

In spite of the 'digital divide' problems that African nations have faced in the past, in this new era, these nations have to look past these and make decision for this industry for the C21st and the future. Decisions as to how to allocate telecommunications resources for example such as their spectrum and the format the regulation and ownership these should take is although pressing issues for economic reform will turn out to be massive follies for African nations economically, culturally and especially in areas scientific and educational advancement, if they do take the time to study and formulate adequate and appropriate plans for structured future growth. In this regards, the hesitancy in forming hurried international alliances and linkages in this area while they try to understand what exactly what is happening should be seen not as reluctance but rather as a cautious part of the African way of operating. It is possible that with training in place for indigenous Africans who can participate in the discussions as equals with other nations, the growth phenomenon that occurred in South Korean could happen in African nations.

Currently these nations are involved in Regional collaborative efforts such as Panaftel – The Pan African Telecommunications network which is aimed at improving telecommunication links in Africa by improving intra telecommunications connections in microwave and submarine links, satellite connections as well as in increasing number of switching centers. This network encountered problems for a number of reasons among which were the network relied for support on diplomatic relations with other nations,

[605] Eli Noam, Introduction, Telecommunications in Africa, p11, Oxford University Press, 1999.

which in turn was tied to unfavorable political co-operations[606]. The ending result was that international funding for the network ceased in 1992. [607]

Also, a regional satellite program had been proposed by the Regional African Satellite Communications Organization (RASCOM) , a cooperatively owned national organizations which by 1994 had 35 members nations. By 1998, RASCOM which would have implemented 2 satellite systems in Africa by 1997 with 50 ground segments had still not been launched.[608] In addition to RASCOM, there is Intelsat which had prior to 1995 been the only intra satellite device offering telecommunications services among African countries and the rest of the world, there is also, PAS-3 and PAS-4, services from PanAmSAT which connects African nations and Europe and India respectively.[609] Also, AT & T had proposed the Africa one regional fiber optics network which would have the ability to join with AT & Ts Global Undersea Fiber Optic Network (GUFON).[610] This network would be part of the International Aggregation Model (IAM), which is

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[606] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p261, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[607]Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p261, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[608] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p266-267, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[609] Heather E. Hudson, New communications Technologies for Development: Challenges for Africa, p 283, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.
[610] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p268, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.

expected to not only serve as a means of regional solution for Africa but also allow African to become global participants in telecommunications.[611]

China

With the Chinese , after purchasing wireless systems from the British Marconi Company for Military operations in 1918 and the Japanese for wireless telegraph services for their navy, in 1929, the Chinese Government revoked the licenses of these foreign investors and went on to implement a telecommunications system that though in isolation at the beginning stages later opened up to foreigners.[612] This policy of preventing foreign ownership by not allowing foreigners to own telecommunications services in China was restated in 1992.[613] In China, telecommunications investments have been given a high priority which some see as a “disciplinary bias” rather than an “informed’ recommendation.[614] This is also seen by some though as an indication that the Chinese after rejecting the “open door “ policy of the USA and other foreign great powers because they were compelled to accept unfavorable connections, finally embraced this concept as the format for economic reform.[615] An example of this acceptance is seen in the Chinese allowing foreign satellite companies to enter the

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[611] Mansur M. Nuruddin, Models for Development of Regional Telecommunications Networks in Africa, p268, Telecommunications in Africa, Edited by Eli M. Noam, Oxford University Press Inc, 1999.

[612] Zhou He, A History of Telecommunications in China: Development and Policy Implications, p 64-65, Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.

[613] Zhou He, A History of Telecommunications in China: Development and Policy Implications, p 83, Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.

[614] Paul S.N. Lee, Telecommunications and Development: An Introduction, p 16, Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.

[615] Zixiang (Alex) Tan, The Impact of Foreign Linkages on Telecommunications and Development in China, p267, Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.

Chinese market. One such company is the IDB Communications Group Inc. which was allowed to install Intersat earth stations for China.

This change is policy that started in the late 70's and which is currently continuing has benefited the Chinese and allowed them to grow. This growth has occurred in their economic sector where it has for example, allowed remote areas in China such as Tibet to benefit from this by having their own stock market.[616] It has also occurred in the social and cultural sector as it has also allowed over 81% of the total Chinese Population – about 800 million viewers access to TV broadcasting,[617] and also in its public education and scientific sectors by allowing satellite feeds in Chinese schools.   This policy has also allowed the Chinese to launch satellites for other nations at a lower cost than the market price. They were made however, to sign an international agreement which minimized the number of satellites that they can launch and the price at which this could be done. [618]

European Union

There has been a trend towards relaxing policies in the telecommunications sector of the EU since the 1980's and the EU telecom polices have been based on three factors which are deregulations from a monopoly structure, creation of a harmonized unified EU-wide telecoms policy through the Open Network Provision (ONP) framework and

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[616] Junhao Hong, China's Satellite Technology: Developments, Policies and Applications, p 184 -185 , Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.
[617] Junhao Hong, China's Satellite Technology: Developments, Policies and Applications, p 185 , Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.
[618] Junhao Hong, China's Satellite Technology: Developments, Policies and Applications, p 186 -189 , Telecommunications and Development in China, Edited by Paul S. N. Lee, Hampton Press, Inc, Cresskill, New Jersey, 1997.

implementing of policies to prevent collusive agreements. [619] By 2000, the telecoms sector with a growth rate of 10% was the fastest growing in the EU.[620] It is the aim of the EU to have a clear Internet identity by establishing a .eu domain and ICANN has reportedly agreed upon this.[621]

Also, the EU introduced universal services provision, which specified a basic set of services that were to be offered regardless of the geographic location of the user as well as the creation of independent regulatory authorities in each member state. As a way of providing a guidance for convergence of telecommunications in the EU countries, the European Commission adopted in July of 2000, a policy framework that embodied three goals among which are protection of user privacy, promotion of competition and adopting policies that were pertinent for the Internet age. Furthermore, the policy framework it adopted was one in which telecoms was viewed from a technology neutral concept that concentrated on the convergence aspects of telecoms rather than the individual sectors such as satellite or broadcasting. [622] As as result of this, the EU has also utilized the unbundling of incumbent service provider networks to allow new entrants into the telecoms market. It is launched in 1999 the eEurope initiative which works at providing a comprehensive strategy framework for all relevant sectors that

[619] Press Release, Europa, Speech Mr. Erkki Liikanen, http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/01/356&format=HTML&aged=0&language=EN&guiLanguage=en, 24/7/01.

[620] Press Release, Europa, Speech Mr. Erkki Liikanen, http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/01/356&format=HTML&aged=0&language=EN&guiLanguage=en.

[621] Martine Paulet and Chris Bailey, Internet Rights report on the European Union, http://europe.rights.apc.org/eu/overview.html.

[622] Press Release, Europa, Speech Mr. Erkki Liikanen, http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/01/356&format=HTML&aged=0&language=EN&guiLanguage=en.

relate to telecoms. [623] This initiative is also supposed to 'develop a digital mentality for every European.' [624] By 2001, there were over one hundred and fifty million (40% of the EU nations) were internet users.[625] 80% of all schools in the EU now have internet access and a Futurum project has been set up to debate the Future of Europe via the Internet. A concern EU service providers are currently facing is the pressure from law enforcement units to censor and provide surveillance information on their users. [626] This censorship centers around the UK's Internet Watch Foundation which filters out what is considered illegal and harmful as well as the provides hotlines for the citizens to call give complaints to.[627] There is a European convention on Human Rights which member countries have adapted into their legal systems and the EU Charter of Fundamental Rights which have clauses relating to the Internet on human rights. The EU still has to ratify the EU Charter.

Israel

The Ministry of Communications is the main regulator of telecommunications in Israel. Recently, as part of a restructuring effort, the Government of Israel has opened up this Industry by privatizing its ownership in Bezeq, Israel's incumbent fixed wired service provider. It has also, allowed the growth of CLECs as well as legislated a regulatory

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[623] Press Release, Europa, Speech Mr. Erkki Liikanen, http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/01/356&format=HTML&aged=0&language=EN&guiLanguage=en.

[624] Martine Paulet and Chris Bailey, Internet Rights report on the European Union, http://europe.rights.apc.org/eu/overview.html .

[625] Martine Paulet and Chris Bailey, Internet Rights report on the European Union, http://europe.rights.apc.org/eu/overview.html.

[626] Martine Paulet and Chris Bailey, Internet Rights report on the European Union, http://europe.rights.apc.org/eu/overview.html.

[627] Martine Paulet and Chris Bailey, Internet Rights report on the European Union, http://europe.rights.apc.org/eu/overview.html.

environment that allowed for growth. These changes started in 1984[628], when the Government of this nation, formed Bezeq and transferred to it management of formerly operated government facilities. In 1994, Israel passed regulations that allowed Bezeq to participate in the cellular market as Pelephone[629] and function Internationally as Bezeq International Ltd. In addition to this, these regulations allowed Israel's Telecommunications Industry to become competitive and grow to include such telephony companies as Cellcom, Partner, MIRs, Barak, Golden Lines, Zahav, Xphone and Netvision.[630]

In addition to the telephony market, the satellite sector of the this Telecommunications Industry is also growing with the addition of a Satellite TV service provider and 3 G mobile services which were made possible by the 1996 Telecommunications Act. [631] This Act was further amended in 2003, to allow CLECs to participate in the wired telecommunications market without the obligations of providing contributions to Universal Services. The deadline for this that the Knesset set was September 2004.[632] Telecommunications deregulation in Israel was centered at reducing barrier to entry.

In Israel by the end of 2003, there were 3.1 million lines direct exchange lines are available from Bezeq which uses a 100% digital network. Phone services access is available to 99% of the population. Broadband access is also available to 43% of the population while availability is available to 99%. The cellular market uses SMS, WAP,

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[628] Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
[629] Telecom in Israel, the Ministry of Communication http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
[630] Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
[631] Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
[632]Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.

GPRS, CDMA, and 1 X technologies. In the long distance telephony sector, major network infrastructure building has included Lev a 5 Gbs Fiber Optic cable line between Israel, Cyprus and Italy as well as MED nautilus a 3.84Tbs DWMD connection between it and Cyprus, Greece and Italy.[633] In the Internet market, there are 70 competitive and 5major ISP support about 2 million users[634]. The Multi-Channel TV subscriber by the end of 2004 were Matav, Tevel, Golden Channel and a DBS provider Yes that is 49% owned by Bezeq and which services use AMOS-1 satellite that are owned by Israel.[635] Currently in Israel, cable operators use HFC networks instead of the traditional coaxial cable. In addition to AMOS -1 there is also AMOS-2 , and the Gurwin II Tech SAT for remote sensing purposes as well as ImageSat designed nationally by IAI which it uses for surveillance purposes .[636] The Ministry of Telecommunications of Israel is pleased with the fact that Israel contributes intellectual resources to the world as a leader in the field of technology the ICT industry is the leading economic export of this nations.

Israel is also part of the Next Generation Internet (NGI) link that connections through Star Tap(Chicago) to the US's Internet 2 Network which has a Point of Presence in London to the EU's GEANT network, and to QMed the Mediterranean consortium Quantum extension. This nation is also part of telecommunications agreements with other international countries and organizations including the WTO[637]. Currently it does not have a policy on VoIP and is in the process preparing a comprehensive policy that

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633 Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
634 Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
635 Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
636 Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.
637 Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.

will recognize and include the postal authority of that nation as part of telecommunications while encouraging advanced postal services. [638]

United Arab Emirates

In the United Arab Emirates, Telecommunications grew as a response to both internal and external stimuli for sustained economic growth in the seven Emirates. Before 1971, the seven countries were independent operators, however, in 1976, Etisalat was formed by the British Cable and Wireless and the United Arab Emirates Federal Governments.[639] At this time, Etisalat, has exclusive licenses to provide services for the UAE. It is publicly owned by United Arab Emirates nationals and the governments in a 40 -60 percent holding.[640] In 1993, Etisalat, deregulated its terminal market and allowed others to provide equipment for its nationals.

By 1998 the UAE had four earth stations and was of a member of the Fiber Optics Around the Globe (FLAG) network. It had also signed a Memorandum of Understanding with 16 internationals in South-East Asia, the Middle East and Western Europe to become part of the "digital light wave superhighway" SEA-ME-WE3.[641] It was also involved in the Fiber Optics Gulf (FOG) project, which as a submarine fiber project that

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[638] Telecom in Israel, the Ministry of Communications, http://www.com/gov.il/mocdoa_iis.dll/Serve/Item/English/1.2.1.1.html.

[639] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 148 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

[640] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 148 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

[641] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 153 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

links the UAE to Kuwait, Qutar and Bahrain.[642] Further deregulations have allowed Etisalat to have 26 percent participation in Thurayya Satellite Company, a private company that will provide the UAE with satellite mobile telecommunications.[643] The UAE is of the opinion that an improved high quality telecommunications services will help it to continue to achieve its development goals.

The preceding section has given a brief look at some of the activities that other nations are engaged in. The importance of this section is that international organizations from the USA are involved in some of these proposed projects that were discussed or are already involved in on-going telecommunications projects globally. As a result of this, the economic viability of these companies are affected by laws that are made in the USA which is their home base.

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[642] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 153 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

[643] Muhammad I. Ayish, Telecommunications Trends and Policies in the United Arab Emirates and their Implications for National Development, p 155 , The Information Revolution and the Arab World, Its Impact on State and Society, The Emirates Center for Strategic Studies and Research, 1998.

APPENDIX 3

HISTORY OF TELECOMMUNICATIONS LAW

1910

The Wireless Ship Act – Required that passenger vessels carry radio equipment that can exchange messages up to 100 miles[644]

All Interstate, Foreign wireless and federally monitored wired communication became part of the Interstate Commerce Act.[645]

1912 Radio Act of 1912

The Radio Act gave the Secretary of Commerce and Labor a registering authority which allowed for the distribution of radio station licenses by wave lengths. The licenses also specified the station wattage, times of operation and locations. The act did not provide any regulatory or controlling status to the Secretary, nor did it state grounds for rejection and all licenses were accepted.[646] This led to rapid growth in the number of operating stations and an off shoot of this was that interference problems among radio stations and signals started to occur when station owner violated the terms of their licenses. This made it impossible for consumers to receive any coherent broadcast signals. These problems caused the passage of the Radio Act of 1927 and it was primarily concerned with broadcasting.

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[644] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p155, Houghton Mifflin Company, 1972.
[645] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p155 Houghton Mifflin Company, 1972.
[646] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p155, Houghton Mifflin Company,1972

Radio Act of 1927

The Radio Act of 1927, defined radio waves and the electromagnetic spectrum as a national natural resource with no one owner[647] that could be used privately only if the public benefited. It also recognized that the receiving of broadcasting services was a right of all but instituted qualifying standards for getting a license to broadcast. The Act also extended the Constitutional Freedom of Speech protection to broadcasting as specified by the First Amendment and allowed for specific regulations by the government while allowing the government discretionary options to meet unanticipated circumstances as long as they were in the interest of the public.

This Act clearly defined the federal government as the regulator of all forms of radio communications while making allowance for challenges to decision made by the government by the due process of law. The Act instituted a five man Federal Radio Commission to handle the implementation aspects of it content. These personnel were appointed by the President and ratified by the Senate.[648] The main focus of the FRC in implementing the Act of 1927, was really the setting of engineering standards that reduced interference. A practice that was instituted in 1930 was that of using Hearing Examiners to filter legal evidence that were submitted by parties of interest during initial hearings. This is a practice that is still used.

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[647] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio,p160, Houghton Mifflin Company, 1972.
[648] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p162, Houghton Mifflin Company, 1972.

Radio Act of 1934

In 1934, upon President Roosevelt's recommendation that the management of all matters pertaining to communications become consolidated in one single government agency, Congress redefined and remodeled the Radio Act of 1927 and added to its jurisdiction the control of interstate and international wire communications. The new governing body that ensued from this reorganization was a seven person Federal Communications Commission (FCC). In broadcasting, while the Radio Act of 1927 allowed the FRC to reduce signal interference, the Radio Act of 1934 allowed the FCC to concentrate on program quality.[649]

1940 -1945

1941 Chain Broadcasting Regulation of 1941

Criticism against the Radio Act of 1927 and 1934 was that it did not take into consideration, the influence of network evolution and could not regulate the growth of this broadcasting structure.[650] Networking had started as method of sharing program costs. Essentially the network relationship under censure at this time was one in which NBC and CBS who were the at the time the National Networks had through strategic sales options contracted with other licensed radio stations making them affiliates and by 1938 controlled 40% of the 660 radio stations in an affiliate relationship. [651] This actions prevented access to the affiliates from other competing broadcasting systems, while dictating the programs, airtime as well as controlling the income and national airtime of

[649] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p167, Houghton Mifflin Company, 1972.
[650] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p164, Houghton Mifflin Company, 1972.
[651] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p168, Houghton Mifflin Company, 1972.

these affiliates. [652] They did this through the use of exclusive and long term contracts and the prestige of association with a National Network made affiliates susceptible in this relationship. A complaint by Mutual Broadcasting System resulted in the Chain Broadcasting Regulations of 1941 by the FCC which lessened the control the Networks could have over their affiliates and allowed for more competition.[653] Even though this ruling was contested, the Supreme Court held in favor of the FCC who later applied this regulation to television. [654] An outcome of this ruling was that an NBC network got sold and this became the American Broadcasting Company(ABC).

This is an example that may be construed as showing ‘'that the FCC reacts to change portions of its rules only when it has been contested, rather than by actively seeking to ensure that the rules are in place to mitigate against misuse or even to promote ahead of time new innovations. This may give the impression that the FCC acts retroactively rather than proactively. Such an assertion would not necessarily be true, rather the FCC's rulings should be looked at from the point of view that it is pragmatic and acts cautiously and when there is new evidence that necessitate that it changes past decisions, the FCC does not hesitate in rescinding past decisions. This claim could be seen in the area of development of standards for American television. In 1928, the FRC had granted licenses to NBC's W2XBS to proceed with the experimentation of picture broadcasting well ahead of the time that this actually became a necessity in the 1940's.[655]

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[652] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p174, Houghton Mifflin Company, 1972.
[653] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.
[654]Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.
[655] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.

In 1940, the FCC moved FM channels to the 42-50mc band.[656] However, in 1945, new engineering evidence caused the FCC to reverse its 1940 FM channel allocation decision and FM channels were moved to the 88-108mc band.[657] An outcome of this was that pre 1945 receiving sets that operated on the old band could not function in the new and there was concern that FM would replace AM as the transmitting medium for radio as it had been specified as the standard for television. Also in 1945, the FCC allocated 20 FM channels for non commercial educational broadcasting use.[658]

During the time leading to the 1940 FCC's decision on FM spectrum allocation, picture telecasting innovations had been growing rapidly with innovations by individuals and by research companies. In1936, the BBC had aired public picture telecasts using the UHF band and in the USA, when the onset of the television industry growth was signaled by the sale of American home television receivers in 1939 by Allen B. Dumont, the FCC had steps in place for its regulation and by 1941 the licensing of commercial television stations started. In that year the FCC authorized WNBT and CBS to begin commercial television broadcasting operations.[659] Licensing was to be granted to 18 VHF channels in the 50-294mc band and the audio component of television was to be FM rather than AM.[660] What had to be resolved before this was which television standard should be adopted. This was because in May of 1940, the FCC had withdrawn a February 1940 decision that had allowed the development and implementation of three incompatible

[656] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.
[657] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.
[658] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p182, Houghton Mifflin Company, 1972.
[659] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, 1972, p192, Houghton Mifflin Company, 1972.
[660] Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.

and different television standards as a means of stimulating and testing the new medium.[661] The withdrawal came because RCA one of those allowed to implement a standard and who at the time had a patent and had made the biggest investment in the research of receivers, instituted a massive sales campaign of its sets. The FCC saw this as an attempt to influence the market at the expense of the other two accepted standards proposed by Dumont and Philco.[662]

In correcting this error, the FCC used the recommendations of engineering experts from the National Television Systems Committee (NTSC) which was formed to recommend and select a standard. The recommendations that evolved were essentially those that had been proposed by RCA[663] and in July 1941, the FCC adopted these black and white television standards. These standards were adopted by the FCC against objections by CBS which wanted color standards to be established. This was because the NTSC felt at the time that there was still a lot of unknown about color television standards[664] even though as early as in 1929, H. E Ives of AT& T laboratories had shown public demonstrations of color television.[665]

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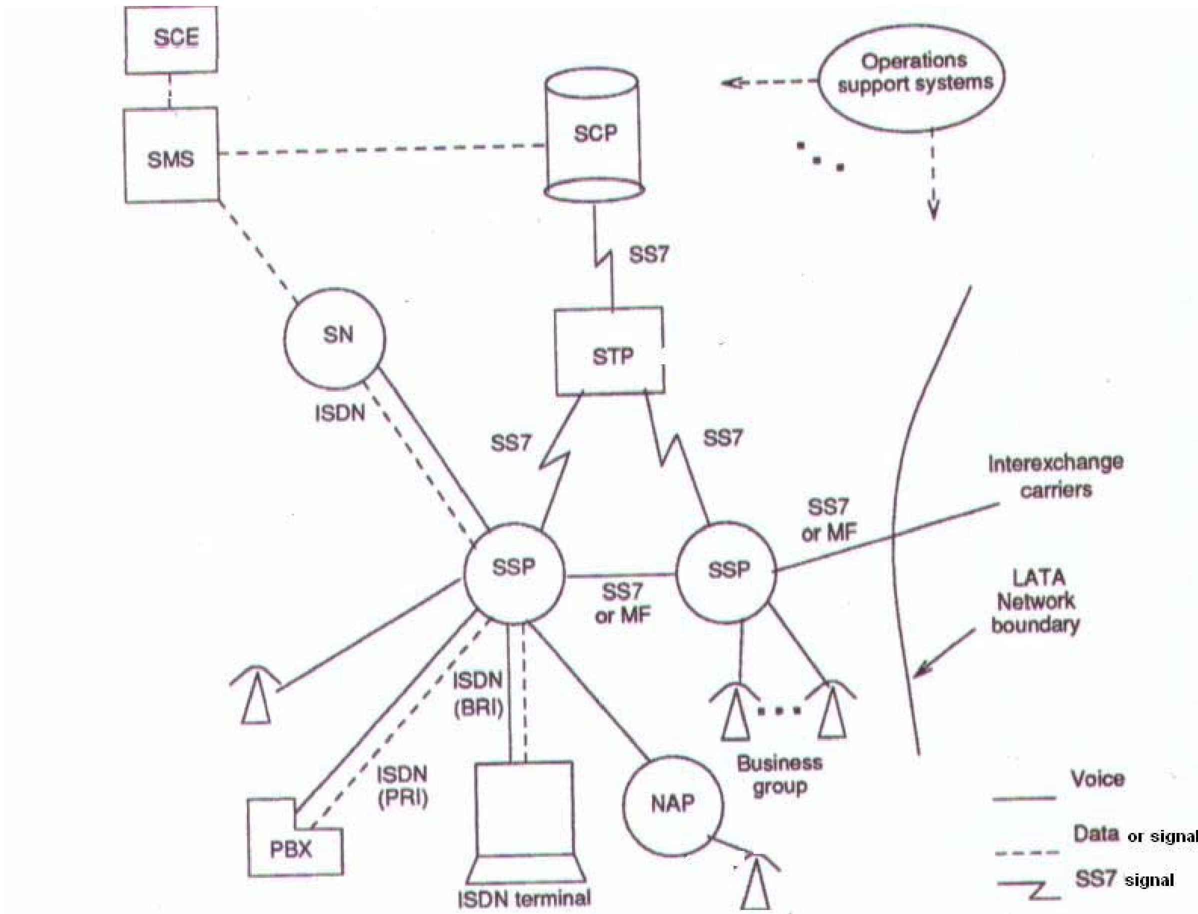
661 Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p175, Houghton Mifflin Company, 1972.
662 Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p192, Houghton Mifflin Company, 1972.
663 Head, Sterling, Schofield, Spann, McGregor, Broadcasting in America, Eight Edition, A Survey of Electronic Media, p44, Houghton, Mifflin Company, 1998.
664 Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p193, Houghton Mifflin Company, 1972.
665 Sydney W. Head, Broadcasting in America, Second Edition, A Survey of Television and Radio, p193, Houghton Mifflin Company, 1972.

APPENDIX 4

NETWORK ELEMENTS IN THE INTELLIGENT NETWORK ARCHITECTURE



Source: Bayliss

APPENDIX 5

INTELLIGENT NETWORK ELEMENT PROCESSES

Service Switching points (SSP)[666] E.g. PBX, LAN, Cable Modem[667]

- o Starts the IN process.[668]
- o Determines that a query has to be made.
- o Determines off-hook, dialing, and routing triggers

Service Control Point (SCP)[669] E.g. – directory database server or gate keeper

- o Has a Network Information Database (NID)
  - ▪ NID has information about:
    - • The network.
    - • The Services.
- o Contains the Network Resource Manager (NRM)
    - • The NRM Locates the elements for call handling
    - •
- o Started with 800 Private Virtual Network and Alternate Billing Services.[670]
- o Has real time logic of the service.[671]

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[666] E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 104 -109, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[667] Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p63, Cisco Press, 2005.

[668] E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 104-109, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[669] Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[670] Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 360, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[671] Christian Chabernaud & Stéphane Goerlinger, Requirements on IN nodes to meet QOS objectives, p55, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

- Tells SSP how to process the call. [672]

Service Circuit Node (SCN)[673],[674]/ Service Transfer Point(STP)[675] E.g. a gateway

- Is the central node in the Intelligent Network System.
- Contains the customer records.
- Is a programmable intelligent device.
- It has intelligence or Service Logic Programs (SLP).
  - SLP puts together Functional Components (FC) to form IN Services
    - A Functional Component is a basic element of handling a call
  - SLP Logic Interpreters (SLI) perform SLP to provide services
    - SLI handles the sharing of information between IN elements
-
- Allows for the call creation and call handling services
- Provides for data and image services.
- Can be used as a stand alone unit connecting to a local telephone switching system.
- Can be use higher in the Intelligent network
- It is a fault tolerant real time control computer
  - Logic program it uses are from the SCE

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672 Christian Chabernaud & Stéphane Goerlinger, Requirements on IN nodes to meet QOS objectives, p55, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

673 E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 104 -105, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

674 E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 104 -112, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

675 Lee Dryburgh, Jeff Hewett, Signaling System No. 7 (SS7/C7), Protocol, Architecture, and Services, p62, Cisco Press, 2005.

- Allows for fast modular software update
- All call processing and Operations, Administration and Maintenance (OA&M) control of the SCN reside in this computer

- It connects, routes calls to specialized service circuits
    - Supports different services using different circuits
    - Service circuits are:
        - o Tone Generators
        - o DTMF Ringers
        - o Power Ringers
        - o Conference Bridgers

- Provides services such as: voice announcements – E.g. An Intelligent Peripheral[676]
    - o Text to speech conversion
    - o Facsimile reception/transmission
    - o Automatic Speech Recognition (ASR)
- It originates and terminates services to end users
    - o Provides direct dialing to a # on the SCN
    - o Provides for call forwarding to # on the SCN
    - o Self initiates services

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676 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

Service Creation Environments(SCE)[677]

- Creates Service Logic Programs.

Service Management Systems(SMS)[678]

- Part of the Service Control Point (SCP)[679]
- Contains the service reference data.[680]
- Process end of calls, computes charges.[681]
- Manages the subscriber data and service logic in the SCP.[682]

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677 E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 105, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

678 E. G. Sable, R. L. Bennet, G.Y. Wyatt, P.B. Shanghavi, Evolution to the Advanced Intelligent Network, p 107, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

679 M. V. Kolipakam, B.P. Murphy, J. I. You, Personal Communications Services, using the Intelligent Network, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

680 Christian Chabernaud & Stéphane Goerlinger, Requirements on IN nodes to meet QOS objectives, p55, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

681 Christian Chabernaud & Stéphane Goerlinger, Requirements on IN nodes to meet QOS objectives, p55, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

682 M. V. Kolipakam, B.P. Murphy, J. I. You, Personal Communications Services, using the Intelligent Network, p 385, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

- o Facilitates the capability to change and create services to Administrators and customers in the SCP
- o Distributes data and other codes to network elements.[683]
- o Provides customers information about their service status. [684]
- o Accepts request from customer to modify service parameters.[685]
- o Exchange information between SMSs.[686]
- o Post data in databases for access privilege.[687]
- o Restricts illegal access into databases.[688]
- o Provides a trace feature to determine status of transactions.[689]
- o Supports global dictionary features.[690]

683 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
684 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
685 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
686 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
687 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
688 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.
689 Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

Network Access Points (NAP)[691]

- o Detect Intelligent Network activation triggers.
- o Pass on signals to SSP for processing.

Operations Support Systems(OSS) [692]

- o Allows IN to operate in an efficient and reliable manner
- o Uses 2 function types
  - o The Operations Administration and Maintenance Center (OA&M) that allow IN to operate.
    - Does not include Network Traffic Management.
  - o Network Management Systems (NMS)[693]
    - Performs Central Network traffic management
    - Performs congestion management and control

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[690] Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[691] M. V. Kolipakam, B.P. Murphy, J. I. You, Personal Communications Services, using the Intelligent Network, p385, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[692] M. V. Kolipakam, B.P. Murphy, J. I. You, Personal Communications Services, using the Intelligent Network, p385, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[693] M. V. Kolipakam, B.P. Murphy, J. I. You, Personal Communications Services, using the Intelligent Network, p385, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

Service Provision Point (SPP or Service Management Access Point (SMAP))[694]

- Has commercial data pertaining to subscriber
- Connects to the service Data management
- Communicates with (Service Management System) SMS :
  - to update the service data

An Intelligent Peripheral[695]

- Provides services such as:
  - voice announcements –
  - Text to speech conversion
  - Facsimile reception/transmission
  - Automatic Speech Recognition (ASR)

Adjunct Processor

- Interfaces with the SSP
- Has Service Logic programs (SLP)
- Has a Network Resource Manager (NRM)
  - Provides functions for locating IN element for calling handling continuation and completion.
- Has a service Logic Execution Environment –(SLEE)

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[694] Christian Chabernaud & Stéphane Goerlinger, Requirements on IN nodes to meet QOS objectives, p55, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

[695] Balaji C. V. Ramarao, Role of Application Gateways in Global Intelligent networks, p 359, Intelligent Networks, The Path to Global Networking, Paul W. Bayliss, Editor, Proceedings of the International Council for Computer Communication Intelligent Networks Conference, Tampa Florida May 4-6 1992, IOS Press, 1992.

	o Provides for both the hardware and application space for the execution of services for the various servers.

APPENDIX 6

FUNCTIONAL ENTITIES AND CORRESPONDING FUNCTIONAL ELEMENTS

Physical Plane	Distributed Functional Plane
SSP	**Call Control Function (CCF)**—Provides call processing and switch-based feature control. This includes the setup, maintenance, and takedown of calls in the switching matrix and the local features that are associated with those calls. **Call Control Agent Function (CCAF)**—Provides users with access to the network. **Service Switching Function (SSF)**—Provides cross-functional processing between the CCF and SCF, such as the detection of trigger points for IN processing.
SCP	**Service Control Function (SCF)**—Directs call processing based on Service Logic Programs. **Service Data Function (SDF)**—Provides service-related customer and network data for access by the SCF during the execution of service logic.
SMS	**Service Management Function (SMF)**—Manages the provisioning and deployment of IN services and service-related data. **Service Management Access Function (SMAF)**—Provides the interface for accessing the SMF.
SCE	**Service Creation Environment Function (SCEF)**—Provides for the creation and validation of new services. Generates the logic used by the SCF.
IP	**Specialized Resource Function (SRF)**—Provides resources for end-user interactions, such as recorded announcements and user input via keypads, voice recognition, and so forth.

APPENDIX 7

OTHER MIDDLEWARE PROJECTS

1) Object Management's Group's Common Object Request Broker Architecture (CORBA). CORBA is an architecture standard that integrates Object Request Brokers(ORBs). ORBs allows for the interoperability and portability of program modules across different programming languages, hardware platforms, operating systems and ORB implementations as well. It allows for the transparency across distributed systems.

2) Microsoft's Component Object Module/ Distributed Component Object Module (COM)/ DCOM. This is a structure for integrating objects and it allows for interoperability and reusability among distributed objects. COM is an API that allows for the interaction of components in a binary manner specified by Microsoft. DCOM is an extension of COM and allows for the networked based component interaction. COM/DCOM work together with other components such as OLE, ActiveX, and MTS to allow and Enterprise Information System to be built using COM.

3)The Linux Standard Base (LSB) is a project of the Free Standards Group. The Free Standards group is a joint venture by Linux developers to standardize the internal structure of Linux based systems. It specifies standard libraries, commands and utilities that extend POSIX. [696] Portable Operating System Interface (POSIX) is a standards protocol for computer operating systems that want to qualify for the name "Unix".[697]

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[696] Wordiq.com, Linux Standard Base, http://www.wordiq.com/definition/Linux_Standard_Base.
[697] Wordiq.com, POSIX, http://www.wordiq.com/definition/POSIX.

APPENDIX 8

SIP PROXY SERVER PROGRAM MODULES AND FUNCTIONS

The Proxy Server performs the following functions:

- Acts as a **A Location service**

    - program module that resides in the in the SIP proxy server.
    - It has the information about a callee's possible locations
    - Contains Bindings of addresses of record keys and contact addresses.
    - Creates and removes bindings
    - Updates bindings
    - Processes the route header field of call packets in loose routing process.

- Acts as an intermediary by acting as both a client (UAC) and a server (UAS).
- Makes request on behalf of other clients (UACs).
- Performs routing functions by sending message to next UAS on the hop
- Enforces Policies.
- Checks to see if a client (UAC) can make a call
- Assumes Call Control and may rewrite messages before forwarding them.
- Contains the Route set:

  The route set is the ordered SIP URIs which proxies must use when sending a particular request.

User Agent Server

A logical Entity that is part of the proxy server.

Generates a response to a SIP request

Response can accept, reject or redirect a request

It is active during the duration of the transaction

User Agent Client

- A logical Entity that may be part of Proxy Server.

- Network element that can send SIP requests and receive SIP responses

- Clients participate in a SIP Session.

SIP Session

- Has multi media senders, receivers and data from senders to the receivers.

- In a session, a callee can be invited, many times to the same session.

- Makes up the SIP transactions.

- Sip Transaction is first request from client to server to final response

Registrar[698]

- Acts on registrar requests.

- Places information of these request into the location service for the domain

- Is usually co-located with a SIP proxy or SIP Redirect Server.

- Maintains a binding between a URL and the exact client location.

- Maintains security by making data stored only available to Redirect or Proxy Servers.

Back-to-Back User Agent[699]

Processes request in a manner similar to a User Agent Server(UAS),

Also act as a User Agent Client and determines how to answer incoming requests.

Participates in in all request within a dialog and maintains the dialog state.

APPENDIX 9

[698] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com.
[699] V.K. Gurbani, F. Haerens, V. Rastogi, Internet Society, RFC3976 Interworking SIP and Intelligent (IN) Applications, http:/rfc3976.x42.com.

H.323[700] NETWORK ELEMENTS

GateKeeper

- Provides address translation and network access control for H.323 terminals, gateways and Multipoint Control Units MCU.

- Perform bandwidth management, accounting and centralized dial plans,

- Manages a zone. There can only be one gatekeeper per zone. A zone is a collection o gateways, terminals and MCU devices.

FUNCTIONS

- **Address Translation**

    - Translate H.323 ID such as xyz1@domain.com and E.164 numbers(standard telephone numbers) to endpoint IP address

- **Admission Control** – Control endpoint admission into the H.323 network.

    - Uses **H.225 Registration Admission and Status (RAS**) to manage:

        - Asmission Request (ARQ)

        - Admission Confirm (ACF)

        - Admission Reject (ARJ)

- Bandwidth Control - Manages Endpoints Bandwidth Requirements.

    - Uses **H.225 to manage:**

        -Bandwidth Request (BRQ)

        -Bandwidth Confirm (BCF)

        -Bandwidth Reject (BRJ)

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- **Zone Management**

- Provides zone management for all registered endpoints in the zone by controlling the endpoint registration process

- **Call Authorization**

– Can restrict access by time of day policies to certain gateways or terminals.

- **Call Management**

– keeps a Database of all active calls in progress and uses it to indicate busy endpoint or to redirect calls.

- **Bandwidth Management**

– Reject admission when the required bandwidth is not available.

- **Call Control Signaling**

– Routes call signaling messages between H.323 endpoints using Gatekeeper Routed Call Signaling (GKRCS) Model.

–- Allow endpoints to send Call signaling messages directly to each other.

- **H.225 Call Signaling**

-Perform call signals between Gatekeepers, Gateways, Terminals and MCU by:

1) Discovery – RAS Gate_Keeper Confirm (GCF) or Gate Keeper_Reject (GRJ) sent by Gate keeper to Gateway or terminal which had sent a Gate Keeeper_Request. (GRQ)

2) Registration –Gateway Terminal or MCU tell the Gate keeper of their IP and alias addresses with an (RRQ) Registration_ Request, Gatekeeper accepts (RCF –

Registration_Confirm) or (RRJ- Registration-Reject) rejects Gateway or terminal or MCU.

3) RAS Admission - An endpoint tries to initiate a call by sending an admissions request (ARQ). The Gatekeeper grants authorization by allowing an admission confirmation (ACF) Or Gate Keeper rejects call initiation by giving an admission Reject (ARJ)

- Perform RAS Request Location
- Performs call Signals between Gatekeepers to Request Location (RAS Endpoint Location.) This is usually made between gate keepers to get the IP address of an endpoint in a different zone. It allows a particular zone to become part of another zone. It is the connection between two zones or two networks and is done in the following manner:

1) Gate keeper 1 sends an LRQ – Location Request to Gate keeper 2

2) Gate Keeper 2 can in turn send a LCF – Location_Confrim and send its own address channel or that of an endpoint. Or, Gate Keeper 2 can in turn LRJ – Location_Reject if the needed endpoint is not available or not registered.

- Performs RAS Status Information

- Gate keeper can use the RAS Channel to obtain information on if an endpoint is online or offline by the following manner:

1) Gate keeper sends an IRQ (Information _Request to endpoint asking of its status.

2) End Point sends an IRR (Information_Request_Response) to Gatekeeper or Gateway to tell its active.

3)Gate Keeper sends an IACK (Info_Request_ Acknowledge) to acknowledge IRR Or Gate Keeper sends and INACK (Info_Requst_Neg_Acknowlege) to IRR in the negative if information is not received.

- Performs RAS Bandwidth Control

Although this is first established with the ARQ/ ACF/ ARJ call registration sequence it may be that there is the need to increase bandwidth. The RAS Bandwidth control accomplishes this with Bandwidth control functions such as :

1) Endpoint sends to Gatekeeper a BRQ (Bandwidth Request) wanting more bandwidth.

2) Gate keeper confirms with a BCF and accepts Bandwidth increase.

3) Gate keeper confirms with a BRJ requesting Bandwidth increase

4) Gateway sends an RAI (Resource Availability Indicator) to Gatekeeper indicating resource available.

5) Gateway Sends an RAC (Resources Availability Confirm) acknowledging reception of RAI.

APPENDIX 10

EXECUTIVE SUMMARY

The Start of the Twenty First Century is an exciting time for the Telecommunications Industry. The emergence of the technologies of the Internet as a major communication tool is stirring considerable excitement - so much in fact, that it is causing the industry to be at a cross road. In this situation, telecommunications finds itself evaluating all the different methods and ways the newer technologies of the Internet with it online banking, shopping and entertainment – movies and concerts on-demand can be managed to promote even more growth. There are online game libraries with endless supply of games that allow groups in disparate location to play games in virtual landscapes in real time. There are also camera phones - [a once futuristic technology], this is now a reality. Furthermore, these allow people to see each other as they communicate. There are also phones so tiny that they can fit in less than half of a normal palm and these make providing products and services for clients and consumers a very lucrative business for telecommunications suppliers. All of these are allowing the economy to experience growth.

There is also video conferencing that makes the method of doing business less tiring for those who travel a lot by allowing them to be with others from countries all over the globe and exchange ideas in real time from the privacy of their office. Online payment systems that make paying bills less strenuous are also widely as well. Sporting events can also now be seen from computer or television screens, and yes people do talk to each other still, even though now it is more through texts, and yes computers that are now the size of tiny pocket phones all add to the excitement. For those who like their news, there are more news sites on the Internet some updating news information hourly than can be imagined and there are search engines that give more information than can be used.

At this exhilarating pace, of things even as it moves forward to embrace the new technologies of communicating that Internet innovations are making available, the Telecommunications Industry finds itself embroiled in issues of governance. This is because each new innovation has an associated governance concern. Among the many the industry is now considering are:-

Who and how should taxes between countries during Internet transaction be billed? How should phone calls be billed and regulated? Do people have rights on the Internet? Is so, how is human right now defined at a time, when the information of almost every one is in some form of computerized database that newer and ever faster networks make less than a second away? What are the privacy rights that humans now have? How is it defined? How is it violated? Who owns what? How is ownership defined for goods that people buy over the Internet in a country that is not theirs? When does the good become theirs? Can legitimate volume mail be sent for products consumers did not solicit? If so how? How should value for Internet performances be rated? How should the Internet be governed? Will the Internet cause the current political structures to be destabilized? Are the current frequencies that new products use to allow for transmission safe for humans? How are children and the elderly protected on the Internet? Also, this is an area that has not been widely discussed in regulations but it involves how the discarded electronic components should be handled? A handful of states now have solutions for the discarding of electronic devices. However, this is a regulation that must be considered as chemicals from these devices have the potential of polluting water tables. How should this be done?

The euphoria of the Internet creates more questions than answers can be given for. Newer and better technologies are created every day even before regulators have time to have their traditional processes of listening to all sides of an issue, it is already old news and dated information. Of late a troubling concern for regulators of the Telecommunications Industry is finding out what constitutes a 'whole' among newer technologies so that full understanding can be obtained for effective regulatory formulas of the reality the industry is experiencing.

In the past, the industry relied on regulating content. It did this with the different sectors of the Telecommunications Industry, by regulating 'like' structures. As such a Silo Method of regulation occurred where some believe vertical boundaries existed between the different sectors of the industry. However, with the 'new' telecommunications, all the different sectors now use and rely on the bits of the electronic media. Packet technology in which information is broken down into bits which are sent in packets that utilize many different routes over networks of varying architectures to get to the same destination, is used by both incumbents and competitive telephony providers. This brings with it the problem of how the different groups should be regulated.

Governments are also in the business of caring not only for the well being of the market sectors of their nations but also for the well being of their general pubic. Public interest, convenience and necessity are big factors in how the laws of telecommunications are changed and implemented globally and especially so in the USA. Globally as a result of growing concern over the safety of the Internet, some very traditional countries have devised strict government regulations as a means of protecting their citizens during this period of uncertainty in telecommunications, while other governments have tried to incorporate incrementally appropriate changes in the laws of their nations to accommodate the changing environment. One such government in the latter group is the United States of America. Using amendments to its already established laws, this government has tried to change the models and framework by which the industry is regulated.

In recent years, especially in the regulation of the Telephony Industry, the method of law and rule formulation has moved from content regulation to one in which the technologies are getting regulated in what has been described as a Horizontal Layers method of regulation. This methodology is based generally on the engineering format of the technologies utilized by the Internet rather than by the content nature of the service.
The aim of this form of regulation relies on the premise that both the incumbent and new license holders of telecommunications services provision will be able to make available the different technologies at reasonable rates so that innovations will continue at a faster pace for the advancement of the economy and the well being of the citizens of this nation. This form of regulation is not without its challenges as it moves the laws which govern this industry from a traditionally regulated monopoly structure to one in which deregulation and competition is encouraged. Benefiting from deregulation laws are the relatively new Internet services such as VoIP.

Internet services rely on the IP based technology which contributes to the effectiveness of the Internet in that it allows users and devices to communicate at a faster rate using voice, data picture and sound - multimedia over Internet protocols and uses packet switching networks and technologies rather the traditional telephony circuit switching networks of telecommunications service providers. The technology Voice over Internet Protocol (VoIP) is not entirely new. Regional incumbent telecommunications voice service providers as well as incumbent long distance voice service providers have been using it for a while.

Concerns with this new service that the telephony industry faces, is that the technology that is currently available for the provision of VoIP services is easily accessible and the industry has almost no barriers to entry. Another VoIP problem is that traditional telephone companies are now offering Television, Radio and Internet services. In the past this method of operating was not allowed as the broadcasting sector was regulated differently from the telephony sector. However, with the introduction of these new non telephony services the Telecommunications Industry finds that there are new policy issues that have to be addressed. A major concern that regulators now have is deciding how to treat voice services which have been a regulated sector of the economy when it merges with areas such as information services and the Internet services which have not been regulated. Essentially, the decision process centers around the merits of the Silo method of policy making and regulating as opposed to the Layers method that was created when industry was deregulated and emphasis was placed on the network elements as factors of regulation. Regulation was then limited to the Basic and Telecommunications services while Enhanced and Information services were not. The Internet falls into the unregulated Information service. Some view this as inconsistent regulations and have relied on the courts for clarifications. To make these points of similarity, the technologies were looked at from both the perspective of the details of the technologies as well as from the wording of the law.

This paper first considered whether the Silo method of regulation is in actuality the same as using the Horizontal Layers method of regulations and showed that this is the case. Then it tried to determine if Enhanced Services are the same as Basic Services and whether

Telecommunications services are the same as Information services and showed that given that the pair sets as noted were the same and then it went on to conclude that all these services were essentially the same. While studying to some detail the technologies of VoIP, the paper also showed that VoIP although an Internet technology is similar to traditional telephony, is both a telecommunications service and information service based on the definition as given in the law as well as the technologies that are used and that as a result of this, the current regulatory environment for this service is inconsistent given that it is not subject to PUC and other State regulations while traditional telephony is. Furthermore, it showed that from a policy perspective the layers model is an appropriate tool for regulation of VoIP given that the structure of the Internet is in actuality built on the structure of the laws. Given that this is the case, the conclusions are that the laws are as they are now are appropriately structured to handle the regulations of these new services. This conclusion does not hide the fact however, that in its present implementation, there are inconsistencies in the requirements of the laws. As a result of this, the paper examined the effects of the laws on current telecommunications policies pertaining to the Internet and telephony and areas where there are inconsistencies were discussed and analyzed. This paper looked at the work of Richard S. Whitt (2004) in detail and dissimilarities between the author's views and Whitt were analyzed. Although issues pertaining to the Internet and the structure of its organization were discussed briefly, the topic of Internet regulations specifically not be covered by this study – only those aspects of its relations to telecommunications were looked at

Finally, some of the issues that currently cause concern in the Internet sector were looked at to see how they currently affect or has the potential of affecting the functioning of the Telecommunications Industry. In this area the conclusion was made that the structure of the FCC as it presently exists though adequate is not really equipped to handle newer issues. The recommendation was made that given that these are factors that are entirely new and which had not been experienced before – examples of this are online banking and E-commerce, new arrangements have to be made. As a result of this, the Congress of the United States has to provide new or modified laws and rules that will guide the FCC in dealing with these newer conditions in the Telecommunications Industry. When this is done right, it will enhance the competitiveness if the USA internationally, while allowing this nation to maintain a healthy and growing economy.

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